THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXIII. No. 1616.] LONDON, MAY 1, 1894. [46TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.

THOMAS ALLAN & SONS,
Bon Lea Foundry,
SOUTH STOCKTON-ON-TEES.

ALSO MANUFACTURERS OF
SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

GLASGOW OFFICE: 24, GEORGE SQUARE.
Telegrams:
"BONLEA, STOCKTON-ON-TEES."
"SPRINGBANK, GLASGOW."

'Killskale Fluid'

For preventing
Scale and Incrustation in Boilers.
Guaranteed to contain no injurious Chemical.
WRITE FOR SAMPLES.

JAS. MILNE COOPER & CO.,
Bradford, Yorks.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cubic feet.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

ESTABLISHED 1830.—
PARKER & LESTER,
Manufacturers & Contractors.

THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD,
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WOLSTON'S
TORBAY PAINTS
Special Quotations to Gas Companies.
DARTMOUTH, DEVON.

THE "C" BURNER.
NEW HIGH-POWER GAS-LIGHT.
INCANDESCENT GAS-LIGHT SYSTEM.

Consumes
3¾ cubic feet per hour.

Gives a light of
70 to 80 candle power.

Brilliant Light.

Perfectly Steady and
Noiseless.

Smokeless.

Reduced Heat.

The Ordinary Burner, with Special Globes, is suitable for Lighting Private Houses, Public Houses, Restaurants, Shops, &c.

Special Lamps constructed for Outside Lighting and Street Lighting; and Large Clusters of Lights made for Lighting Halls and large Areas from one centre.

Can be attached to any Gas-Fittings.

THE TRIUMPH OF GAS OVER ELECTRIC LIGHT.

Taking Gas at 3s. per 1000 cubic feet and Electric Light at 8d. per Board of Trade unit, the "C" Burner will produce an equal amount of light at **One-eighth the cost of Electric Light.** This cannot be disproved.

Substantial and Pushing Sole Agents wanted in each Town using Gas.

For Terms and Particulars, apply to the Manager of

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14, PALMER STREET, WESTMINSTER, LONDON,
Near St. James's Park Station.

SAWER & PURVES, Garratt St. Works, MANCHESTER,

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IMPROVED WET GAS-METERS IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

IMPROVED DRY GAS-METERS.

Speciality: PATENT CASH PREPAYMENT METERS.

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Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

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CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

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☞ Retort Setters sent to any part of the Kingdom.

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NEARLY

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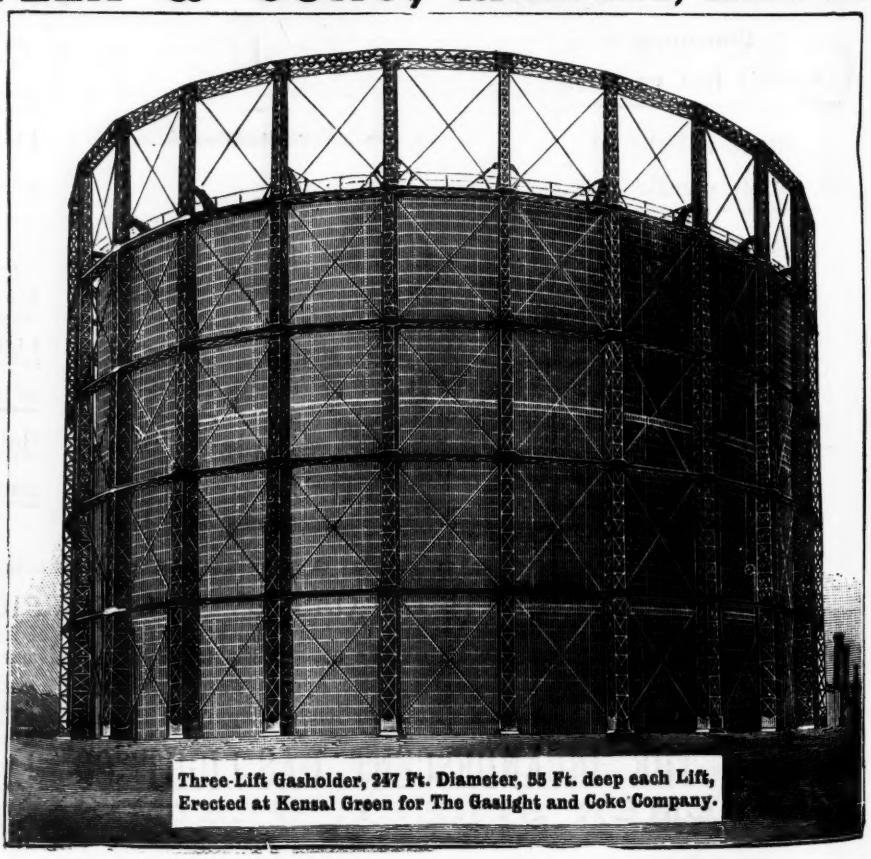

Three-Lift Gasholder, 247 Ft. Diameter, 55 Ft. deep each Lift, Erected at Kensal Green for The Gaslight and Coke Company.

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GAS APPARATUS OF EVERY DESCRIPTION.

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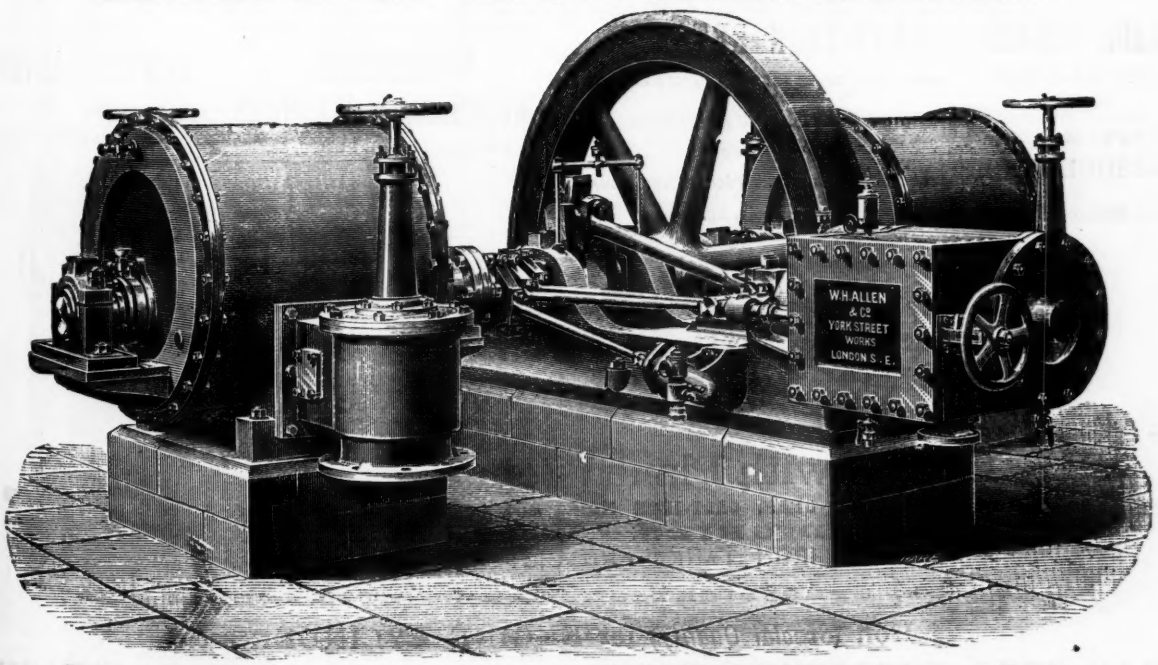

Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

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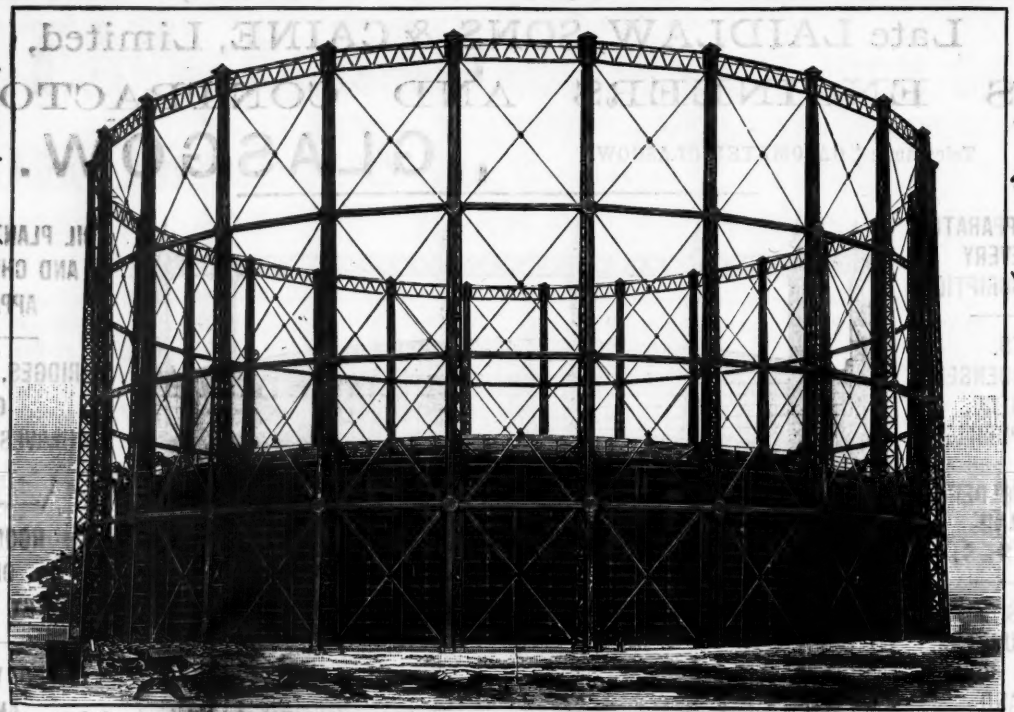

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INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

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BELFAST.	BOMBAY.	BRISBANE.	HARTLEPOOL.	LIVERPOOL.	READING.	STOCKHOLM.
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REAL OLD SILKSTONE GAS COAL,

Address THE STRAFFORD COLLIERIES COMPANY,

Near BARNSLEY, SOUTH YORKSHIRE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

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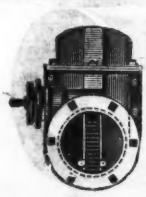
GASHOLDERS, AND Gasholder Tanks.



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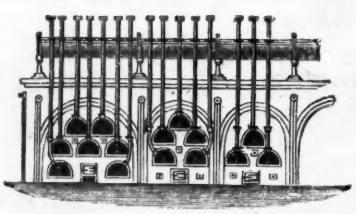
RETORT-BED FITTINGS,

And Retort-House Appliances

of every description,

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.



WROUGHT AND CAST IRON CONDENSERS, SCRUBBERS, & WASHERS,

TAR AND LIQUOR PUMPS, &c.

PATENT CENTRE-VALVES

for working Purifiers,

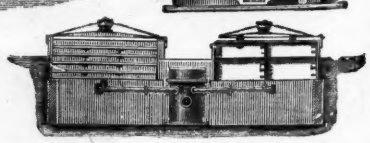
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

TELEGRAPHIC ADDRESS:
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GAS & WATER
WORK
J. & H. ROBUS,
ENGINEERS & CONTRACTORS,
20, BUCKLERSBURY, LONDON, E.C.,
furnish Plans, Estimates, and Specifications for SINKING BOREHOLES *and* WELLS; *Erecting* RESERVOIRS, FILTER-BEDS, *and* GASHOLDER TANKS; *and* EVERY REQUISITE *for* GAS *and* WATER WORKS,
INCLUDING
MAIN LAYING
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Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS GAS-VALVES, STEAM & WATER VALVES TOOLS, &c. AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Short Street, LAMBETH.

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John Cowley & Son

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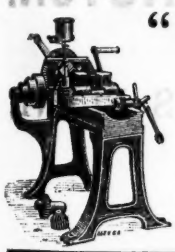
MANUFACTURERS OF
SCREWING MACHINES AND GENERAL TOOLS FOR ENGINEERS AND GAS-FITTERS.
SOLE LICENSEES AND MANUFACTURERS OF
"TURNER'S" PATENT TAPPING APPARATUS
FOR DRILLING AND TAPPING GAS, WATER, OR OTHER MAINS UNDER PRESSURE.
ILLUSTRATED LIST ON APPLICATION.



CLARENDON STREET,
HYDE, near Manchester.
TELEGRAPHIC ADDRESS: "COWLEY, HYDE." TELEGRAPH CODE: "A B C, 4TH EDITION."

PHILADELPHIA EXHIBITION, 1876.
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The Highest Award for Gas-Retorts and other Goods in Fire-Clay has been awarded to KING BROTHERS for their Goods made from their renowned Stourbridge Fire-Clay.

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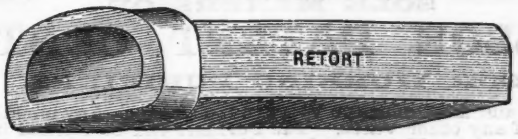


Proprietors of
STOURBRIDGE CLAYS,
Manufacturers of
Fire-Bricks, Tank Blocks, Glass-House Bricks and Pots, Gas-Retorts, Crucibles in Clay and Plumbago, Gas-Oven Bricks, Bricks for Regenerator Furnaces and Hot-Air Stoves.
STOURBRIDGE, ENGLAND.
CRUCIBLE MANUFACTORY, 46, PENN STREET, CURZON STREET, BIRMINGHAM.
N.B.—Gas, Blast-Furnace, and Glass-House Bricks and Glass-House Pots always in Stock, or made on the Shortest Notice.

THE WHESSOE FOUNDRY CO., LTD., DARLINGTON.

Established 1790.

MANUFACTURERS OF EVERY DESCRIPTION OF GAS PLANT,

FROM

RETORTS

TO

GASHOLDERS,

FOR WHICH THEY HAVE THE NEWEST AND MOST MODERN MACHINERY.

GASHOLDERS CAN BE MADE OF ANY DIAMETER AND PUT TOGETHER AT THE WORKS.

Holders having a capacity of 6,000,000 Cubic Feet have been made and erected; the largest one being 181 feet diameter by 136 feet 9 inches deep. Riveted entirely with $\frac{3}{8}$-inch diameter Hot Rivets.

SOLE MAKERS OF

THE WHESSOE PATENT CENTRE-VALVE

FOR WORKING PURIFIERS.

This Centre-Valve is the cheapest and most effective Valve in the market. Any unskilled workman can understand it; and it costs about half the price of any other Valve. The Purifiers can be worked in rotation or bye-passed singly, or bye-passed altogether; and the Valve can be worked either as a Hydraulic or Dry-Faced Valve.

AND SOLE MAKERS OF

COATES' IMPROVED PATENT FURNACE DOOR PROTECTOR

Which has been approved and adopted by the Gas Authorities at

SALFORD, MANCHESTER, BIRKENHEAD, STOCKTON, NEWCASTLE, DARLINGTON, &c.

Telegraphic Addresses: "WHESSOE, DARLINGTON." "WHESSOE LONDON." | T. COATES, MANAGING DIRECTOR. | WORKS: DARLINGTON. LONDON OFFICE: 28, QUEEN STREET, E.C.

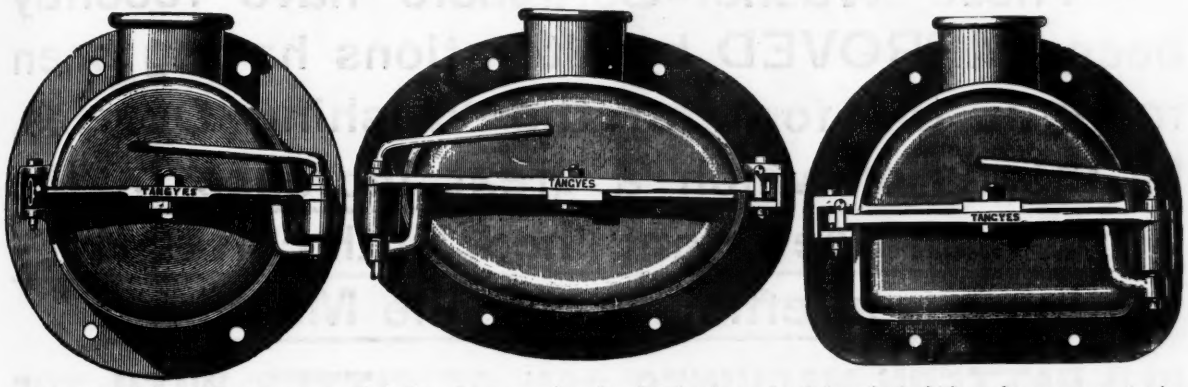
TANGYES LIMITED, CORNWALL WORKS, BIRMINGHAM;

AND AT

LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, BILBAO, ROTTERDAM, & CALCUTTA.

MORTON'S SELF-SEALING RETORT-LID,

With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



These Retort Lids and Fastenings are made in three forms, round, oval, and ⌂ (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these Lids are recommended to make their selection, in order to avoid cost of pattern-making, delays, &c., &c.

QUOTATIONS WILL BE GIVEN ON RECEIPT OF PARTICULARS OF REQUIREMENTS.

LIST OF PATTERNS ON APPLICATION.

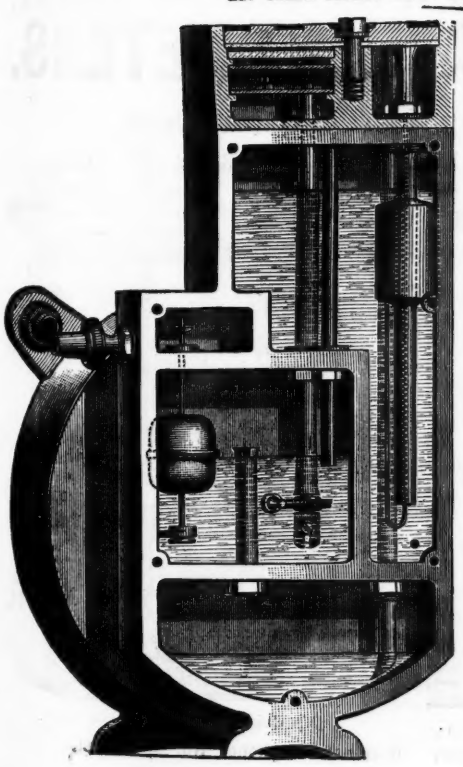
Telegrams: "TANGYES, BIRMINGHAM." No. 90 E.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.



Sole Makers of Green's Patent Underground Wet Gas-Meters for Street Lighting, &c., and Ogden's Patent Spindle Tube for Wet Gas-Meters.

GREEN'S PATENT UNDERGROUND METER

Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required, and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s., and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 3½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid, which does not injure the fittings; and this can be supplied at about 1s. 3d. per gallon.

Prices and all Information on Application.

NEW GRANGE WORKS, EDINBURGH.

HIGHEST AWARDS given for our WET and DRY METERS at

Exhibitions held at GLASGOW, CALCUTTA, and EDINBURGH.

KIRKHAM, HULETT, & CHANDLER, Limited

PATENT

"STANDARD" WASHER-SCRUBBERS

These Washer-Scrubbers have recently been IMPROVED by alterations having been made in the form of the Washing Devices, by means of which a great increase in the wetted surface is obtained, with corresponding increased efficiency of the Machines.

OLD PATTERN MACHINES CAN BE FITTED WITH THE NEW PATTERN SEGMENTS AT A LOW COST.

Estimates furnished of the cost of altering old Machines or the supply of new Machines with latest improvements.

Address: 3 & 4, Palace Chambers, Bridge Street, Westminster, S.W.

GEORGE ORME & Co.,

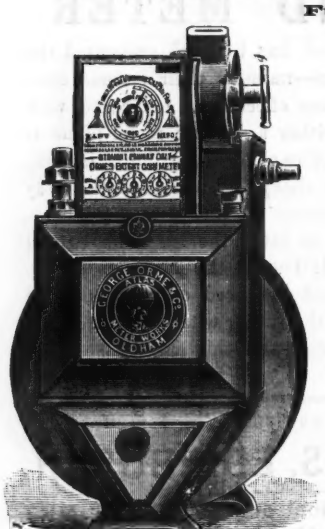
ATLAS METER WORKS, OLDHAM.

ORME'S PATENT COIN PREPAYMENT METERS.

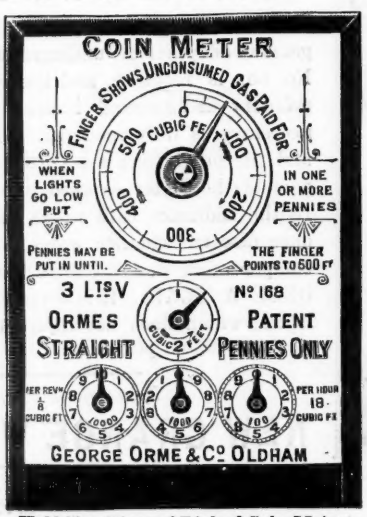
Wet Meters in Cast-Iron and Tinplate Cases. Dry Meters in Tinplate Cases.

NEW PATENTED ARRANGEMENT FOR ALTERING THE SELLING PRICE OF GAS.

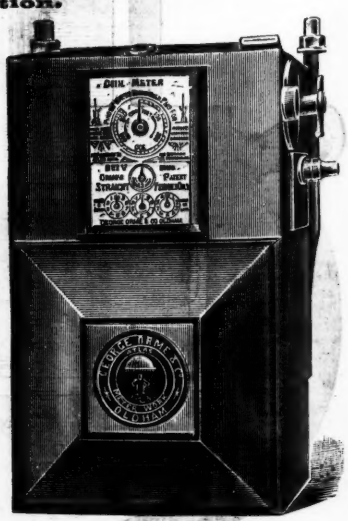
Full Particulars sent upon Application.



Wet Coin Meter in Tinplate Case.



Half-Size View of Dial of Coin Meter.



Dry Coin Meter in Tinplate Case.

Telegraphic Address: "ORME, OLDHAM." A.B.C. Code (4th Edition), used. National Telephone: No. 93, Oldham.

Telegraphic: "Fortress, Donnington, Salop."

C. & W. WALKER,

Telegraphic: "Fortress, London."

MIDLAND IRON-WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE.

London Office: 10, FINSBURY SQUARE.

PURIFIERS with Planed Joints.

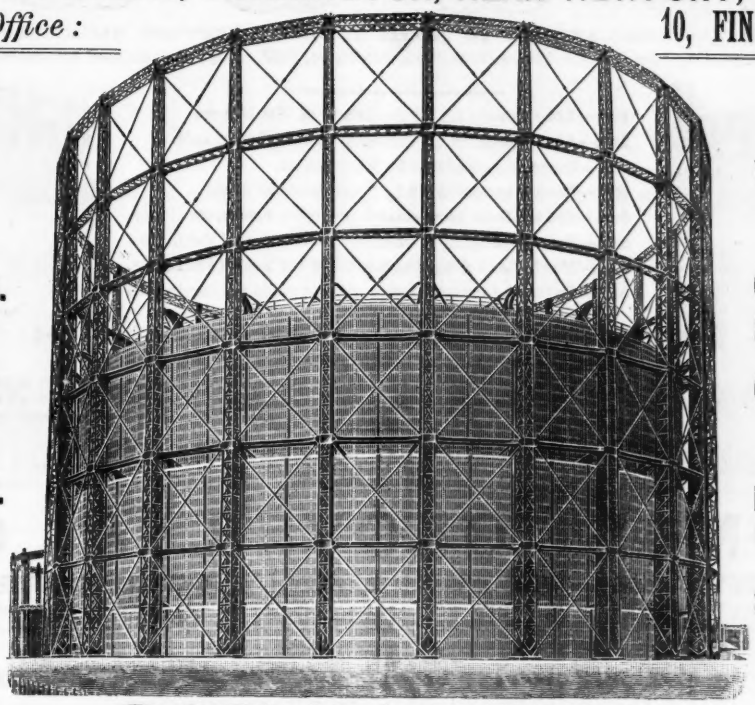
TOWER SCRUBBERS.

PURIFYING-MACHINES FOR AMMONIA.

CONDENSERS.

TAR PLANT.

SULPHATE OF AMMONIA PLANT.



GASHOLDERS.

WASHERS.

WASHER-SCRUBBERS.

CLAUS' SULPHUR-RECOVERY PLANT.

CENTRE & FOUR-WAY VALVES.

RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES, &c., &c., &c.

The largest Gasholder (four-lift) of The Gaslight and Coke Company, Beckton, containing 8 million cubic feet, was erected by us.

SOLE MAKERS OF **WECK'S** PATENT CENTRE-VALVE.

THE AUTOMATIC GAS-METER CO., LTD.,

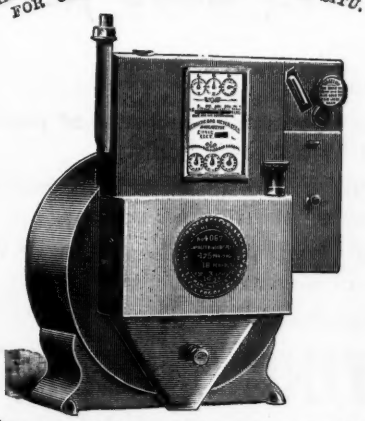
UPPER BROOK ST., MANCHESTER.

SOLE PROPRIETORS OF

THORP, MARSH, AND HAYNES' PATENTS.

PENNY-IN-THE-SLOT GAS-METERS.

THE AMOUNT OF GAS GIVEN IN EXCHANGE FOR COIN CAN BE ALTERED *IN SITU*.



The persistent efforts of the Inventors of our Meters have been crowned with

SUCCESS.

There can be no two opinions on the question of the priority of our claim to the consideration of Gas Companies as *the First* Introducers, on a Practical Scale, of a Penny-in-the-Slot Meter.

THE AMOUNT OF CASH PLACED IN THE BOX IS RECORDED. THIS IS A COMPLETE CHECK AGAINST FRAUD.

PENNY-IN-THE-SLOT GAS-METERS.

So long ago as 1889, we advertised our Penny-in-the Slot Meters as having the now fully-recognized advantage of ability to alter IN SITU. Automatic Meters without Coin-Counting Index are liable to be tampered with.

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MANCHESTER: UPPER BROOK STREET.

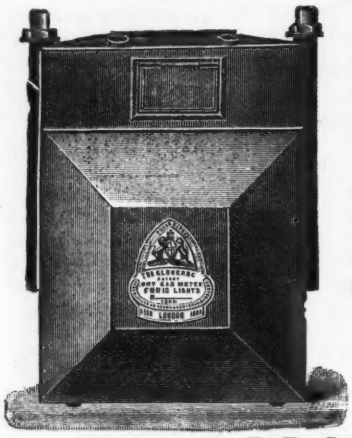
LEEDS: 5, MERRION STREET.

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

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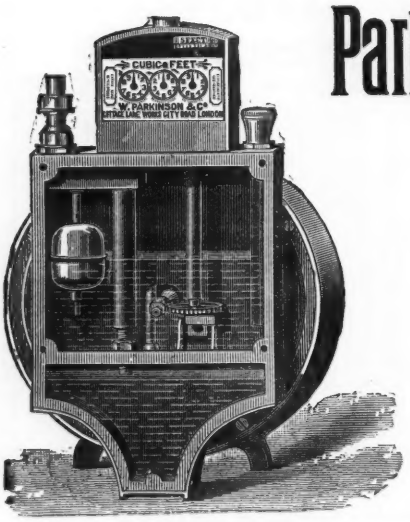

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 1, 1894.

The Gas Industry and the Coal Trade.

As we have occasion to mention in another paragraph, the great army of the coal miners of Great Britain, which might achieve almost any object within the bounds of legality, if united for the purpose, is now actually divided into two or three camps. The difference of policy between the Federation men and the Miners' National Union, for example, in regard to the question of the legal eight-hour day is specially conspicuous. There are times when the Federation seems to make most noise in the world of mining politics; but this is chiefly because it is a newer organization than the National Union, the leaders of which have perhaps less of the enthusiasm of youth on their side. On the other hand, the northern society counts among its leaders men who have done more for their supporters than is generally remembered in these newsmongering days, when the freshest voice attracts most attention. The Miners' National Union recently held its annual delegates' meeting in Durham, under the presidency of Mr. Thomas Burt, M.P., who delivered an address which should be regarded as an official declaration of the principles that guide the policy of this important industrial organization. It is therefore interesting to note that while Mr. Burt is not in favour of limiting hours of labour by legislation, with the object, avowed by the New Unionist party, of necessitating the employment of additional workers, he rejoices over the tendency of the age in this general direction. He regards the defunct Employers' Liability Bill as representing the least that should be done by legislation in resettling the relations between employers and employed; and he will certainly not accept "contracting out" upon any terms. With all his predilections, however, Mr. Burt has a good deal of the old-fashioned political economist in his composition; and he said something very much to the point on the subject of the "living wage." He regarded this as a question of an ideal, and said he was glad that it is being made "apparent to employers and to the public generally that "at any rate the prime question (necessity?) was that the "labourer should be paid for his labour." He went on to argue strongly that it should be made "clear to large "companies, such as gas companies, railway companies, "and especially to employers of labour in connection "with mines, that they could not enter into long and "low contracts recklessly and without due consideration, "on the presumption that they might come and ask the "workmen to submit to a reduction of wages in conse-"quence." Here let us interpolate the observation that, while Mr. Burt is to be commended for his effort to place wages beyond the squeezing power of coal dealers, a protest must be entered against his mixing up of the parts of seller and purchaser in this passage. Gas companies in particular are notoriously good paymasters of their men; and we are quite sure that if, by any action of theirs in making their coal contracts, they could secure reasonably good wages to the getters and handlers of the material, they would gladly take it. But the gas coal demand is only a small fraction of the total draught upon the coal supply of the United Kingdom. Mr. Burt admits that the facts of the coal trade must be fairly looked in the face by everybody concerned. "No doubt the workman wanted a "living wage; and he was entitled to a living wage. The "employer no doubt would also like a minimum profit. "But the minimum wage and the minimum profit depend "upon prices; and prices depend, if not entirely, very "much upon demand."

Well, now, we ask, what have gas manufacturers, as an order of coal buyers, to do with this question? So far as their requirements go, they tend to the advantage of producers; for in the first place they are constant and imperative, and in the second place have hitherto been growing regularly year by year. Mr. Burt complains of the coal trade that it is liable to extreme fluctuations; but this remark does not apply to the gas coal division of the industry. Where gas coal is bought one year, it will be bought the next, and the next again, unless the conditions alter very considerably indeed. Consequently, the gas coal branch ought to contribute an element of stability to the whole trade. Yet what is it capable of doing in this regard? According to some statistics quoted by Mr. Burt himself, the maximum output of the British coal-fields was attained in 1891, when it amounted to 197,693,592 tons. Last year the production fell to 175,236,000 tons; being a fall of 22,457,592 tons for the two years. Now the total weight of coal carbonized by all the statutory gas undertakings in the United Kingdom, as given in the Board of Trade returns, was only 10,242,427 tons in 1891, and the quantity has not greatly increased since this date. Making ample allowance for the unstatutory, foreign, and colonial trade, it is therefore possible to state that

not more than 11,000,000 tons of gas coal per annum are required from the coal-fields of the United Kingdom, which is only about 5½ per cent. of the maximum output. Nay, more. What Mr. Burt calls the fluctuation of the demand for British coal between the years 1891 and 1893, for which neither he nor anybody else has attempted to account save in the most general terms, has knocked off from the total bulk of coal sold last year more than double the quantity needed for making all the gas produced from coal raised in the United Kingdom. What, then, becomes of the contention that the prices paid for gas coal have any bearing whatever upon the lot of the average collier? Why, arguing upon the same statistics, not more than one collier in twenty ever touches a lump of gas coal. Yet such is the peculiar nature of commerce that, when there is a disturbance of the coal trade, it seems as if all the burden fell on gas companies. The reason for this is, of course, that, though these consumers of coal do not need very much of the product in comparison with other buyers, what they need they must have at any price; and so the holders of saleable coal make them pay "through the nose" for it. Here, in a nutshell, is the expression of the relations of the gas industry to the coal trade of the country.

Papers for the Institution of Gas Engineers.

MENTION was made in these columns last week of the forthcoming meeting of the Institution of Gas Engineers, to be held at the Institution of Civil Engineers on the 9th and 10th inst.; but we were not then able to give a notification of the papers intended to be read. The list has now been issued, together with the report of the Council and the other formal documents which it is usual to put into the hands of the members before a general meeting; and particulars of these statements will be found elsewhere. It is claimed in the report that the position and prospects of the Institution are satisfactory, and therewith members are expected to be content. Our present concern is only with the list of papers; and we must unreservedly congratulate the Institution upon the promise given here of a useful and interesting meeting. Besides the presidential address, there will be taken on the first morning a paper by Mr. George Livesey upon "The Relations of Capital "and Labour in Gas-Works," which needs no anticipatory remark. The afternoon will be devoted to a paper by Mr. S. Meunier upon "Gas-Works Extensions in Stockport;" and a paper by Mr. Bryan Donkin on "The Comparative "Merits of Gas and Steam Engines" will conclude the technical business of the day. It is well known throughout the profession that Mr. Meunier has had a great deal to do since his appointment to Stockport; and his account of his work there can hardly fail to be of high technical value. Mr. Bryan Donkin's professional productions do not require commendation at our hands. The first paper set down for Thursday is by Mr. Frank Livesey; and it bears the significant title of "A Comparison—Stoking "Machinery or Inclined Retorts." This is a very notorious topic of the day in gas engineering circles; and it is safe to predict that, in dealing with it, Mr. Frank Livesey will be candid, and that his observations will be well canvassed. Mr. J. Tysoe will then give an account of "The "Foulis-Arrol Stoking Machinery at East Greenwich," which will round off the group of papers upon subjects of a mechanical engineering cast. Next come a quartet of papers dealing with gas making and enrichment. Mr. J. F. Bell, of Stafford, is to treat of "The Enrichment of Coal "Gas;" Mr. S. Glover, of St. Helens, will relate his experience of "The Peebles Oil-Gas Process;" Mr. W. R. Herring is to describe "The Introduction, Develop-"ment, and Practical Working of the Oxy-Oil Gas Pro-"cess at Huddersfield;" and Mr. A. M. Paddon will offer a statement on "The Relation of Carburetted Water "Gas to the European Gas Industry in 1894." After perusing this list of promised communications, our readers will agree that, as regards both authors and subjects, it is worthy of the Institution.

While mentioning the Institution, it may be observed th at the third volume of Transactions has been issued. It is a bulky and good-looking book, in respect alike of the quality and the quantity of its contents. A noteworthy feature of the work is the collection of plates, which it is only fair to acknowledge has been printed "regardless of "expense," and not always, perhaps, with due regard to the intrinsic importance or novelty of the subjects illustrated. A few pages of "abstracts of papers published in various "chemical journals, &c.," concludes the volume; but, in the absence of any indication of a system upon which the extracts are made, and in view of their noticeable incompleteness as a record of the technical literature of the year, it might be suggested that more good would be served by simply giving a list of the numbers of certain publications in which special information relating to gas manufacture may be looked for, and so directing the attention of the young gas engineer to fresher fields and newer pastures than are offered in these most useful but somewhat belated annuals.

The Gas Supply of Paris.

IN another part of the present issue of the JOURNAL will be found an abstract translation of the report of the Directors of the Paris Gas Company for the past year, together with a condensed statement of the accounts relating to the working of the undertaking for this period, which were briefly noticed last week. The most remarkable features of these accounts are the falling off in the gas consumption in the French capital and the depreciation in the value of residuals for the period covered, and the great reduction of the profit balance applicable to dividend and to partition with the Municipality. The decrease in the output amounted to 155½ million cubic feet—averaging 1·75 per cent. upon the gas production for 1892. This is accounted for in the report in the now familiar way; special reference being made to the extended use of Welsbach burners, the influence of which is being largely felt by all the important Continental gas undertakings. Though the gas consumption has experienced a check in Paris and its environs, the business of the Company is actually increasing; there being 8070 more consumers on the books on Dec. 31 last than there were on that day twelvemonth. The number of cooking-stoves lent out also largely increased during the year; and it is stated that these appliances are now employed by more than half the consumers. The Directors are pursuing the policy that has answered so well hitherto, of encouraging the introduction of gas into the "apartments" of the tenement houses in which the bulk of the Parisian population is domiciled. What with the decreased demand for gas and the heavy fall in the value of residuals, the surplus profit (which, according to the system by which the undertaking is administered, is equally divided between the shareholders and the Municipality after the formal dividend is provided for) exhibits a serious diminution. For the year 1892, the share of the Municipality was 11,600,000 frs.; this time it is only 8,775,000 frs. We do not know what the Municipality think of this curtailment of their subsidy by the substantial sum of 2,825,000 frs., or £113,000; but it may have had something to do with the issue of their new loan. At any rate, the proof thus afforded of the fluctuating character of gas profits from year to year appears to have damped the ardour of the party of the Municipal Council which has been clamouring for the acquisition of the undertaking, for the perennial "Gas Question" seems for the time to have dropped out of Parisian politics. It is curious to observe that, when the worst is said of the situation of the Paris Gas Company, it cannot be characterized as differing from the recent experiences of the London Gas Companies. The latter, however, having only their shareholders and consumers to think of, have managed to scrape through a period of depression and diminished profits without greatly disturbing anybody. When balances have not been sufficient to pay dividends, the latter have been slightly reduced, as though to remind the proprietors of the undertakings that they are not superior to the general conditions of business; and the deficiency has been made good out of reserves. Where surplus profits are dealt with from hand to mouth, however, as they are under the Parisian system, there is no equalizing reservoir. For many years the Paris Gas Company have poured a golden stream into the coffers of the Municipality; and the latter might have been pardoned for believing that the flow would be constant. This illusion, if it ever existed, has now been effectually dispelled; and the municipal financiers of the French capital, insatiable as is their need, must henceforth make their account with the contingency that the stream of Pactolus which has flowed year by year with ever-growing volume from the source in the Rue Condorcet, is liable to occasional droughts.

The Miners' Eight-Hour Day.

Last Wednesday's vote of the House of Commons in favour of the second reading of the Mines (Eight Hours) Bill means, in the circumstances, little more than the prevalence, with 281 honourable members of all parties, of the opinion that eight hours is long enough for men to work underground. The fact that the Government, the miners' representatives, and other sections of the House specially interested in the subject, are hopelessly divided both as regards the desirability of legislation of this kind, and as to the manner in which an enactment limiting the hours of adult labour in mines should be applied, robs the vote of all practical value. Wednesday's debate makes fairly interesting reading for all who are concerned with the condition and prospects of the coal trade; but for the most part the speeches travelled over well-beaten ground. It is greatly against the *bona fides* of the leaders of the Miners' Federation that they abstained from laying before the Labour Commission their case for limiting miners' work by law to eight hours a day, and then brought their Bill into the House of Commons, where a vote on it must be affected at least as greatly by political considerations as by its merits. There is not much in the objection raised by some opponents of the measure, that its effect would be to put a fractional amount upon the cost of coal to the consumer. This much-enduring personage knows, by bitter experience, that it is not so much the regular, standing charges upon coal mining as an industry which are burdensome upon him, as the shifting, incalculable "ransoms" levied upon him whenever the internal arrangements of the industry get out of gear, or at such times as the middleman has a chance of doing a good stroke of business for himself. The fundamental question in regard to all such schemes of legislation is as to whether legislation is necessary and desirable. We do not believe that it is. The hours of labour of adult men employed in any occupation not regulated by law, for sanitary or other reasons, in the interest of the community, should be left to be settled by mutual consent of employers and employed. Even Mr. Mather, whose eight-hour experiment at the Salford Iron-Works has so exercised the engineering industry, admits that it was the purely voluntary character of this movement that conduced to whatever measure of success attaches to it. Mr. G. W. Balfour has laid his finger upon a weak point in the case sought to be made for the Bill, by showing that miners care so little for the uniform reduction of their working day to eight hours, that they have never yet tried to obtain it by the ordinary means which they have been ready enough to employ for gaining an advantage in the matter of wages. There cannot be the smallest doubt that, if the mining population throughout the country were unanimous in supporting the Bill, it would quickly become law; but then it is not less true that, in this event, they would have the eight-hour principle without waiting for its legalization.

A Water Laboratory.—One of the last official acts of Sir Charles Russell, as Attorney-General, was to sanction the sum of £25,000, the residue of a legacy of the late Richard Berridge, Esq., being given, in trust, to the British Institute of Preventive Medicine for the endowment of a laboratory devoted to the bacteriological and chemical examination of water supplies, with special reference to the discovery of the best means of preventing the transmission of disease through water.

North of England Gas Managers' Association.—The 34th half-yearly general meeting of this Association will be held at the Gas Office, Newcastle-upon-Tyne, next Saturday, under the presidency of Mr. David Terrace, of Middlesbrough. We learn, from the circular issued by the Honorary Secretary (Mr. W. Hardie), that the business will consist of the presentation of the accounts, the election of the officers for the ensuing year, and the reading of the paper on "Gas Undertakings in Relation to the Use of Gas-Engines," prepared by Mr. Herbert Lees, of Hexham, for the October meeting last year, but unavoidably held over for want of time. After the meeting, the members will dine together at the County Hotel.

The Spring Meeting of the Southern District Association.—We are asked by the Secretary of the Southern District Association of Gas Engineers and Managers (Mr. J. W. Helps, of Croydon) to intimate that, owing to the meeting of the Incorporated Institution of Gas Engineers falling in the week in which the spring excursion of the Association usually takes place, the Committee have decided to postpone it till Friday, the 18th inst., when it is proposed to pay a visit to Maidstone, the gas-works in which town are, it will be remembered, under the management of Mr. H. Smythe, the President. Of course, particulars of the meeting will be duly sent to the members.

WATER AND SANITARY AFFAIRS.

The London County Council, by withdrawing their Water Bill as a perfectly hopeless measure, so far abandoned the attempt to obtain power for purchasing "any water-works "wells, waters, or rights to take or convey water." At the same time the provision in the Money Bill had to be omitted, whereby the Council were to be authorized to expend money on capital account in connection with the purchase of land and water rights in the event of the Water Bill becoming law. Thus shut out from the market, so to speak, the next step was a notice of motion in Parliament by Mr. Benn, for introducing a purchasing clause, in favour of the Council, into the Bills of the East London, Southwark and Vauxhall, and West Middlesex Companies. But this manœuvre also proved a failure, being judged equally hopeless with the Water Bill; and Mr. Benn prudently withdrew his notice—the London Conservative members being avowedly and resolutely opposed to any attempt designed for dealing merely with a part of the water supply. The device now adopted is to declare that the Council have carried their inquiries so far that they are really on the very verge of being ready with a scheme dealing with the Metropolitan Water Question on a comprehensive scale. Such was the purport of the evidence given before the Select Committee on the East London Water Bill by Mr. Bassett Hopkins. The crooked argument was held that, as the County Council were considering sources of supply from Wales and elsewhere, it was desirable that no large works at extra cost should be sanctioned in respect of a Company whose undertaking the Council might shortly have to acquire, especially as the works might be "more or less "inconsistent" with what the Council might decide as the ultimate system of water supply. This is very grand. Everything appears to depend upon the decision of the Council. Who wants a water supply from Wales? Where is the money to come from wherewith to buy up the existing Companies' works, and to provide for a supply brought from a great distance at immense cost? If the present supply is good, and the existing sources can be made sufficient, as the Royal Commissioners declare, how can all that be abandoned? If the Council are prepared to buy, as they profess to be, "on fair and "reasonable terms," why should they seek to change the source and supersede the supply? The effect on the Select Committee became apparent as soon as a decision was given in the East London case. The Committee decided that the preamble of the Bill was proved; and when announcing this decision, the Chairman (Sir Joseph Pease) stated that, in dealing with the clauses, the Committee did not propose to limit the amount of works contemplated by the Bill. With the question of purchase they did not deal either one way or the other, except to leave the whole matter open. Neither did the Committee undertake to say what authority, if any, should acquire the water supply. Following the Bill of the East London Company came that of the West Middlesex, with a like result; the Chairman explaining that the Committee were influenced to a large extent by considerations of public convenience and safety, which they thought would be best promoted by a large increase in the power of storeage and filtration. The position thus taken up by the Committee is what might be expected. It leaves the purchasing question unaffected, except, of course, that the forthcoming outlay will have to be recognized and provided for in the case of a transfer, though under conditions which will prevent any demand beyond a bare *quid pro quo* for the expenditure that has been incurred. This being perfectly understood beforehand, no harm whatever is done, though it would certainly never answer in the initial stage of an undertaking.

The preamble of the East London Company's Bill and that of the West Middlesex having been passed (the clauses standing over), the Bill of the Southwark and Vauxhall Company came up for consideration before the Select Committee. The proceedings were subsequently adjourned until to-day, when Mr. Allen Stoneham, the Government Auditor under the Metropolis Water Act of 1871, is to appear in obedience to an order of the House; being required by the opponents of the measure to give evidence in support of their case. Mr. Stoneham, we may suppose, declined to come forward as a witness until compelled to do so; and it would seem that such evidence as

he can give on the subject will have little bearing on the main question. The critical point is the necessity of providing an adequate supply of water for the use of the Metropolis; and it is certain that the demand which has arisen involves a further outlay of money for an extension of works. The preamble of the Bill will be affected by the same considerations as those which have prevailed in the cases of the East London and West Middlesex Bills. The Chairman has declared that the Committee look upon the report of the Royal Commission "as a very authori-" tative document," and regard it "as a text-book on the "water supply." The conclusions expressed in that report, therefore, serve as a guide to the Committee, and cannot fail to help in establishing the merits of the Southwark and Vauxhall scheme. At the same time, we hardly know how the Committee will deal with the fact that the Company have yielded to Government pressure, so as to surrender the clause by which they were to be authorized to take an enlarged supply from the Thames. The Committee might consider that, so far as quantity was concerned, the inhabitants of the district would be none the better for the passing of the Bill. Protection against floods would, indeed, be given; but the supply being so good already, it might be said that no large expenditure need be incurred to improve it. It will be interesting to see how this matter will be dealt with. As the case now stands, the conditions seem anomalous, although a power of inter-sale may open a way out of the dilemma, at least for the present. Another Bill affecting the water supply of the Metropolis is that of the Thames Conservancy, referred to a Select Committee of which Mr. Jackson is Chairman. The preamble has been passed, in that part which declares it is expedient that the powers of the Conservators for preventing the pollution of the river should be enlarged, and made exercisable over an extended area. There is no doubt that the measure is in part framed with an intention to protect the Thames more effectually than is done at the present time against pollution of every kind; but it makes no provision for an enlarged supply, although it adds enormously to the annual payment which the Conservators are to receive from the Water Companies.

Death of Mr. M'Cullagh Torrens.—The death of Mr. William Torrens M'Cullagh Torrens, which took place last Thursday as the result of a street accident, calls for notice in these columns from the fact that the deceased about ten years ago identified himself with the Metropolitan Water Question, and in 1885 introduced the Bill which was subsequently passed as the Water-Rate Definition Act, and became known as "Torrens's Act," altering the basis of charge for water from the rental to the rateable value of the premises supplied. Mr. Torrens was returned to Parliament for the old borough of Finsbury in 1865; and he represented it in four consecutive Parliaments. He was in his 81st year.

A Bird's Nest in a Spent Lime Heap.—Judging from a letter just received from an esteemed correspondent, the Engineer and Manager of a gas-works a few miles from London, birds do not seem to share the aversion to spent lime which is a characteristic feeling of human beings. A portion of a heap of this material upon his works has been selected by a water wagtail as a place for building its nest. Should the little creature produce a family, the young ones should certainly steer clear of hooping-cough and similar juvenile ailments; and if, as was, we believe, held by Rousseau, birds have the power of "confabulating," this new locality for the rearing of progeny may possibly come to be much sought after.

The Cost of a Private Supply of Electric Light.—Mr. J. H. Knight, of "Barfield," Farnham, writes as follows respecting the cost of lighting his house by electricity generated by means of an oil-engine: "The engine each evening during its run of 4½ or 5 hours consumes 1¼ to 1½ gallons of Tea Rose oil. This, at 5½d. per gallon, may be set down at 7½d. There are on the installation thirteen lights; but only seven or eight are in use all through the evening. I find, therefore, taking all the cost of interest and depreciation, the light does not exceed ¾d. per lamp per hour. If I had more lamps in use, the current expenses would be but slightly increased; and the cost of each lamp per hour would be certainly less. For instance, if I had ten or twelve lamps running all the evening, the cost would not exceed 5-16ths of a penny per lamp per hour. A modern engine would use less oil than the one in use here, which is four or five years old, and has not the recent improvements. There is undoubtedly a considerable saving in burning the oil in the engine over burning it in lamps; to say nothing of the absence of smell in the house, the risk of blackened ceilings, and the great convenience of obtaining a light by simply turning a switch. After some months' experience of electric light, I should be extremely sorry to have to return to oil-lamps."

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET

(For Stock and Share List, see p. 813.)

BUSINESS during the past week on the Stock Exchange has remained fully as inactive as it was before. Being settlement week, fresh transactions were decidedly limited and rumours of difficulties in adjusting some accounts also tended to restrain enterprise. Then the attendance towards the close was considerably reduced by the absence of Jewish members and of those who are taking a rest from Friday until to-morrow—the 1st of May being a Stock Exchange holiday. Taking everything into consideration, prices have not drooped as they might have been expected to do for lack of support; and they were aided by a fair amount of investment business. Americans were depressed by bad traffics and apprehension of labour troubles; but our home rails were firm. Silver is still a distracting element and a prey to speculative fluctuations. If the Indian mints are re-opened free, the rupee value may be expected to meet the bullion price somewhere midway. Money has been in good demand all the week; and all that was outside the Bank was taken. The Gas Market showed more activity; and, taken all round, it may be noted as fairly firm. The chief feature was the business in debenture and preference stocks, owing to the demand for choice investment securities. Gaslight "A" was pretty active, and was done almost every day at very steady figures. The secured issues were strong, in response to the demand just referred to; and "J" and "K" advanced a couple of points each. A fair amount of business was done in South Metropolitan "B;" but the other issues were not touched. Nothing was done in Commercial. The Suburban and Provincial Companies were almost stagnant—days passing without a single bargain in any of them. Of the Continentals, Union showed out the strongest; while Imperial fell away, and closed weak, with a fall of 3. Buenos Ayres were ½ lower, affected perhaps by the exchange market. Melbourne bonds advanced a point. Water stocks were quiet and firm; all quotations being unchanged.

The daily operations were: The Gas Market exhibited no marked tendency at the opening; business being fair at about middle prices. Gaslight "K" improved 2; but Imperial Continental relapsed 1. Business on Tuesday was extremely limited; and prices underwent no alteration. Wednesday was a little more active; but prices remained at the same level. Brighton advanced 2½; Gaslight "J," 2; and Melbourne, 1; but Imperial Continental was 1 lower. Thursday was a more active day, especially in Gaslight debenture and preference stocks, which changed hands at nice figures. Buenos Ayres relapsed ½. Transactions again became more limited on Friday; and business was very slow. Quotations did not move. Saturday's transactions were mostly in Imperial Continental, which came in for further hostility, and dropped another point.

ELECTRIC LIGHTING MEMORANDA.

The National Electric Light Association of America—The Abandonment of the French Measurement of the Power of Arc Lights—An Essay on Electric Traction.

AN organization bearing the high-sounding appellation of the National Electric Light Association of America, ought to be capable of producing some notable fruits at its annual gatherings for the purpose of discussing and advancing the condition of the electric lighting industry in the United States. As a matter of fact, however, this is not the case; for although at the last "congress" of the Association, in Washington, the President claimed that there are now in the United States upwards of 2300 central electric lighting stations, representing an invested capital of about 40 millions sterling, in addition to an estimated equal amount in electrical engineering factories, and in spite of the circumstance of the attendance at the congress being the largest on record, its technical or scientific result was *nil*. Even the American correspondent of an electrical contemporary, predisposed as he would naturally be to "crack up" the Washington gathering, was constrained to remark of the occasion that "most of the papers were largely of a trade nature; and, as usual, the discussions by the station managers and others, though excessive in length, were of little or no value." The President (Mr. E. A. Armstrong) made an observation which goes to show that, in the States, as in this country, private capital is no longer to be had for electric lighting ventures. He stated, in the course of his address, that "he had remarked a tendency, especially during the past few months, towards a revival of the agitation for the establishment of municipal electric light stations, which he had reason to think had been instigated by representations of some of the large electrical manufacturing corporations." This statement is only open to one interpretation.

There appears to have been at least one practical outcome of the congress, however, which, as it goes to the credit of the honesty of the electricians engaged, deserves to be mentioned here. The great American invention of "French measurement," whereby a certain class of electric arc lamps became accredited

with the utterly fictitious and illusory illuminating power of 2000 candles, is recognized on both sides of the Atlantic as having served whatever purpose was expected of it. It was a good lie while it passed current. But it no longer deceives the most thick-headed member of a local authority with a grudge against the gas company; and so it is to be abandoned. Moreover, it has often brought the guileless electrician into trouble, when customers, who had been caught by the bait of the many thousands of candle power to be secured at the same price—or a little more—by those who would leave gas for the newer light, came to manifest an inconvenient desire to "see that they got it," by the method of photometry. Accordingly, the National Electric Light Association relegated to a technical commission, composed of Professor Mendenhall and others, the important question of what they should call the 2000-candle power arc lamp, now the public are no longer willing to take it at this valuation. These gentlemen have recommended that henceforward "what is ordinarly known as a 2000-candle power lamp shall be defined as one requiring on an average 450 watts for its maintenance; the measurements being made at the lamp terminals with no sensible resistance in series with the arc." We learn that the recommendation was adopted; thus settling a question that "has been the cause of much friction between arc light companies and municipalities." And we can heartily congratulate the American Electricians upon their conversion, tardy though it be, to an honest policy of stating arc lamps in terms of current consumed. Like the traditional Scotsman, they are in the best position to know that "honesty is the best policy;" for they have "*tried baith.*"

An instructive little article upon the subject of electric traction, by Mr. E. F. Bamber, recently appeared in *Nature*. The writer explains the nature and value of the obstacles that stand in the way of the economical transmission of energy by means of electricity; showing how and why so little of the potential energy of coal is represented in the work actually performed by an electrical motor. He argues from these premises that, before electric traction can be employed on a large scale, there must be a means of producing the electricity on the spot, and at the time it has to be used; or, in other words, we must possess a battery in which the energy of the coal can be transformed directly into electric current, so that we may do without storeage batteries in which to carry electric energy about, or heavy copper conductors through which to convey it at a moderately low tension from the spot where it is produced to where it is used, or light aërial conductors through which to convey it at high tension. Of course, such a convenience is not yet to be had. How long it will have to be waited for, or how many minds are engaged in the solution of this or of some such problem, we know not; but Mr. Bamber is quite certain that the moment it is solved—as solved it will doubtless be—"there will be such a transformation scene in the industrial applications of electricity as can hardly be conceived." It would mean, in this writer's opinion, the application of electricity for almost every purpose, except actual heating. "An electric light-producing battery in every house, quite independently of any mains in the streets; an electric power-producing battery, to carry us whither we would on rails or in the street; and in every house, to put an end to all the evils attendant on crowded factories and workshops in crowded streets and towns—such and other advantages would result from turning electricity from a servant into a master; from a mere transformer of energy into a source of energy." Ah! well—this is a very pretty picture; and it is gratifying to observe that a long and severe course of discouragement has not induced every enthusiastic electrician to pawn his prophet's mantle. Yet there is some small consolation for such of us as are interested in the permanence of things as they are, in the reflection that the future rarely, if ever, develops in exact accordance with the aspirations formed respecting it. Reverting to the consideration of things as they are, Mr. Bamber finds electric traction to be "the most economically difficult application of the transmission of energy." This is bad; but there is worse behind. The same critic knows of six different systems of applying electricity to the working of railways or tramways; and he has little commendation for any others. The only sphere in which he sees a possibility of the successful application of electricity as a locomotive power is in driving light tramway cars, following one another in quick succession; and travelling at a moderate rate of speed. This he believes to be the only way in which an electrical railroad can be made to pay; and it is so far satisfactory to reflect that it is upon this principle that electric traction has been introduced into London and Liverpool. Of the suitability of storeage batteries for tramway working, Mr. Bamber has evidently the poorest opinion, on account of their weight and the necessity for renewing them frequently under the hard stress of locomotive employment.

North British Association of Gas Managers.—We have received from the Secretary of this Association (Mr. R. S. Carlow) a copy of the usual circular issued in anticipation of the annual general meeting, which is to be held in Glasgow on the 26th of July and the following day. Mr. Carlow invites the co-operation of the members with the Committee in making the proceedings as interesting and instructive as on previous occasions, by the contribution of papers; and, with the view of assisting them in their selection, a list of suitable subjects is furnished.

GAS AND WATER BILLS IN PARLIAMENT.

Last week was a busy one in regard to the Gas and Water Bills which have been referred to Select Committees of the two Houses; and some general notes of the progress made will be of interest.

The Lords' Committee of which the Earl of Jersey is Chairman had before them on Tuesday the Bill promoted by the Falkirk Corporation to enable them to supply gas in the burgh and district, to raise the necessary capital, and to acquire by purchase the undertaking of the Falkirk Gas Company, who appeared in opposition. The Company had in the same group a Bill of their own, asking to be incorporated, with the usual powers to increase their capital and extend their works. After the case for the Corporation had been opened by Mr. Balfour Browne, Q.C., and evidence had been given by the Town Clerk (Mr. J. Wilson), the question of the purchase of the Company's works came forward; and it was stated that the Company were willing to consider any fair offer for their property. On the following day, Mr. Molleson, Mr. Henry E. Jones, Mr. Charles Hunt, and Mr. F. T. C. Linton gave evidence; and at its close Mr. Bidder, representing the Company, made a suggestion that the purchase could be carried out, the terms to be settled by arbitration under the Lands Clauses Act. But the Corporation wished, he said, to add to the purchase clause words to the effect that "all the circumstances of the case should be taken into account;" and to this he could not agree, as it would limit the Arbitrator. After some discussion, the Chairman decided that the purchase should take place under the above-mentioned Act, without any explanatory words or directions. Mr. Bidder accepted this decision; and the preamble of the Bill was passed. On the following day, Mr. Bidder suggested the addition to the purchase clause of the words "before commencing to supply gas under this Act." He said it was, of course, understood that there was to be no competition—that the Corporation were to buy the Company's works at once, and that there was to be no setting up and starting competing works, so as to "starve out" the Company before acquiring their undertaking. The words he proposed to add would make it abundantly clear that the Corporation should not go before the Arbitrator and say he must consider the value of the concern subject to the possibility of competition. Mr. Balfour Browne pointed out that their Lordships' decision was that the Arbitrator was to be absolutely unfettered, and that the Corporation were to purchase "forthwith." As they were bound to buy at once, competition was impossible. The fear of the Corporation was that it might be possible to raise upon the words proposed certain arguments before the Arbitrator, and to represent to him that the Committee had recognized the possession of a monopoly by the Company. The Chairman thought the words could be put in, seeing that they carried out the intention of the Committee, and would not bind the Arbitrator. They showed that the first step to be taken by the Corporation would be to purchase the Company's works. Mr. Balfour Browne accepted the addition, on the understanding that the words were not intended to guide the Arbitrator. Mr. Bidder thereupon withdrew the Company's Bill; and the clauses of the Corporation Bill were adjusted, and the Bill ordered to be reported. Some comments on the proceedings on the Bill will be found in our Scotch Correspondent's "Notes."

Next in importance stand the Bills of the three London Water Companies—the East London, the West Middlesex, and the Southwark and Vauxhall—which occupied the attention of Sir Joseph Pease's Committee. Starting with the first-named Bill on Monday, the preamble was passed by Tuesday afternoon. In announcing the decision of the Committee, the Chairman stated that they did not intend to limit the works proposed to be carried out by the Company; nor did they wish their decision to prejudice in any way the question of the acquisition of the water supply of London by a competent authority. The consideration of clauses was postponed until the other Bills had been dealt with. The proceedings on this Bill are reported in our "Parliamentary Intelligence;" those on the other two Bills will be given next week. It may be stated here, however, that on Thursday the Committee passed the preamble of the West Middlesex Company's Bill (under which the Company propose to raise £500,000 of new capital), with a similar expression of their views on the possible future acquisition of the undertaking by a water authority. The Southwark and Vauxhall Company's Bill was under consideration at the close of the week, when the proceedings were adjourned till to-day. As affecting some of the Metropolitan Water Companies, it may be mentioned that the consideration of the Thames Conservancy Bill by the Select Committee of the House of Commons presided over by Mr. Jackson was commenced on Monday last week and continued on Tuesday. The case for the promoters was opened, at considerable length, by Mr. Littler, Q.C.; and after the Engineer of the Conservancy Board (Mr. Moore), the Board's Chief Inspector (Mr. C. Bell), and Mr. J. Mansergh had been examined in support of the measure, the Chairman announced that the Committee were of opinion that the preamble was proved, and that they did not propose to limit the extent of the work mentioned in the Bill. As in the case of the two Water Bills already noticed, the Chairman stated that the Committee, in giving their decision, did not wish in any way to

prejudice the question of the acquisition of the water supply in the Metropolitan district by a competent water authority; and they did not express any opinion as to what the authority should be. The further proceedings were adjourned till yesterday.

Among the Provincial Bills, that promoted by the Newcastle and Gateshead Water Company to obtain power to abandon the construction of a portion of certain works authorized by their Act of 1889, to make a new reservoir and carry out other works, and to raise further capital to the extent of £500,000, with proportionate borrowing powers, was passed by a Committee of the House of Lords, presided over by the Earl of Lauderdale, subject to the acceptance by the promoters of a series of conditions laid down by the Committee. When these were under consideration on Friday, Mr. Littler, on behalf of the Duke of Northumberland, informed the Committee that he intended to ask that compensation water should be secured to his Grace as Trustee for the North Shields Water Company; and, on being informed that the Committee would have mentioned this matter in their decision, if they had any intention of the sort, he stated that he should reserve his opposition on this point till the Bill reached the other House. The Chesterfield Water and Gas Bill, which seeks power to construct a reservoir, and to enlarge the area of the Company's supply so as to include the townships of Heath, Temple Normanton, and Calow, to raise additional capital, and to increase the rates, came on the 20th ult. before a Select Committee of the House of Commons presided over by Sir J. Kitson; and it engaged their attention until Friday last. It was very strongly opposed by the Chesterfield Corporation and the neighbouring Local Authorities. There was a goodly array of Counsel and professional witnesses; among the latter being Mr. J. Mansergh, Mr. Charles Hawksley, Mr. E. M. Eaton, Mr. H. Rofe, and Mr. W. A. Valon, J.P., who were retained for the promoters. The Company's conduct was sharply criticized; and, in the result, the Committee declined to pass the preamble of the Bill—expressing the opinion that the supply of water and gas in the district should be undertaken by the Chesterfield Corporation. As, in the course of the proceedings, Mr. Littler, speaking on behalf of the Corporation, had intimated that if the Bill were not passed the Corporation would apply for authority to do as suggested, the Committee said they should require them to promote a Bill next session for power to purchase the undertaking on fair and reasonable terms. Another Bill disposed of last week was that of the Bury Corporation, which was considered by the Police and Sanitary Regulations Committee on Wednesday. It authorizes the construction of new sewerage works; and it extends for three years the period within which the Corporation are required, by their Water Act of 1889, to afford a supply of water to the inhabitants of Haslingden. No question arose on the first-named matter; but the water portion of the Bill was contested by the Haslingden Corporation, who alleged that the promoters had been dilatory in the discharge of their duties, and that in consequence the supply of water to the higher parts of Haslingden was still inadequate. The Committee passed the preamble of the Bill; and the clauses were subsequently adjusted.

ELECTRICITY AS A SOURCE OF LIGHT.*

THE Municipal Authorities of Dresden have from 1887 to the present day had under consideration various schemes for lighting the town by electricity. In November, 1892, powers were applied for to carry out one of the schemes; and the Administrative Committee of the Town Council were requested to advise on the subject. Herr Hartwig, a member of the Council, was deputed to compile the report of the Committee. Recognizing the general prevalence of ignorance on electrical matters, and the dearth of information on the working of existing lighting stations, he conceived the project of issuing the report to the general public; and, with the consent of the Council, he has now published the first installation.

Under the title of "Electricity as a Source of Light and Power," the compilation forms a popular treatise on electricity and its applications; and, according to the compiler, it provides the requisite data to enable anyone to form an independent opinion on electrical questions. The work practically is in three sections; the first being intended to serve as an introduction to electrical science, especially elucidating the mysteries of the application of the electric current to lighting purposes. Of the ultimate value of a study of this first section of the book to a mind totally unversed in the science, we are not over sanguine; and though without it the remainder of the book would be sealed to the general public, we are sceptical of the benefit accruing to one who travels by such a "Royal Road" to a knowledge of electricity. Pursuant to the avowed purpose of the work, electrical phenomena that do not bear directly on the commercial production of light and power meet with no adequate treatment; and a clear apprehension of the true relative position of the more important facts of the science is denied to the reader. The presentation of isolated facts to be accepted without question or explanation, is not a reassuring feature of the early pages of the book; and we are fain to believe that some indication of their correlation and evolution would be welcomed by those for whom it is designed. The voltaic cell is dismissed in a few lines; but the secondary batteries now so much employed for portable lights, which threaten to drive the antiquated and cumbrous safety-lamp from the precincts of gas-works, receive recognition later in the book, though the author deems explanation of their action unnecessary. It may be prejudice due to academic training that prompts us to look for a definition of "potential" early in the pages of an electrical treatise. But the most "practical" of modern electricians will hardly be prepared to dispense with it altogether; and we feel convinced that Herr Hartwig would have found the elucidation of phenomena easier had he availed himself of it and other terms of electrical theory. We would advise the learner not to be content with the general knowledge of electricity to be acquired by a perusal of the first section of this work, but to read in conjunction with it (or in its stead) some sound elementary text-book of the science. He may then safely trust himself to a study of the portions of Herr Hartwig's book which are intimately concerned with electric lighting; and he will the better appreciate them by reason of his *excursus* in other directions.

Having expressed disapproval of the author's method of exposition of the primary facts of electricity, we have nothing but praise to offer for the care he has bestowed on the work. He started on his quest after the most economical system of town electric lighting, in an unbiassed spirit; and he maintained the same even when facts wholly unsavoury to the advocates of electric lighting in general presented themselves. Of this, we have ample evidence scattered throughout the second and chief section of the book, which deals with the cost of different methods of working for the electric lighting of towns. The data here are chiefly derived from the returns of important towns on the Continent. But, as if to throw into greater relief the costliness of electricity, Herr Hartwig devotes an appendix of more than 80 pages—which may be regarded as the third section of the book—to that modern triumph of economy in lighting, the incandescent gas-light. That a chapter on gas lighting should find a place in a report ostensibly on the various methods of electric lighting is a splendid testimony to the claims to consideration of the older method of illumination; and we can desire no more than that the book before us may fall into the hands of all municipal authorities contemplating the adoption or extension of the electric system, and that they will not fail to peruse the appendix as well as the body of the work.

The practical details of electric lighting are well treated, and errors are not obvious. The principle of the incandescent light—the 2000 times greater specific resistance of carbon than of copper causing heating of the carbon filament—is well explained; and the popular expression "burns," as applied to the glowing of these lamps, is deservedly condemned, since combustion is impossible in the vacuous globe, and moreover the filament is not consumed. The distinction between continuous and alternating currents is then drawn; and the equal consumption of the carbons of the arc under the latter is pointed out among the advantages it offers, as well as the simplicity of its generation, though it will not serve for electrolytic decompositions. Side by side we find the advantages and disadvantages of the continuous and alternating current systems tabulated. The danger to life of high-tension currents is shown by a melancholy record of deaths in the United States and elsewhere; and a number of fires due to sudden heating of the conductors are mentioned, as well as some at the generating stations from other causes. The regulations imposed by Insurance Companies are next quoted; and the evil effects of the too glaring light on the sight are instanced. Then follow explanations of the practical units used by electricians—the ampère the unit of current, and the volt the unit of electro-motive force; and the volt-ampère or watt. But we do not notice that their relation to the absolute units is given. Commutators are treated with much lucidity; and the methods adopted for the measurement of electrical energy are described. In Cologne, 100 watt-hours cost 8 pfennigs; and a 16-candle incandescent lamp is estimated to consume 55 watts per hour. Hence the cost of one such lamp per hour is 4·4 pfennigs, or almost exactly ½d. But, in addition, a meter-rent of 12s. per annum has to be paid for the smallest equipment of ten 16-candle lamps; and, moreover, the meter requires testing at short intervals.

Herr Hartwig then proceeds to enumerate the more important electrical machines; and he gives illustrations of the methods of arriving at the thickness of conductor required for conveying currents of given strength over stated distances, and the loss of electro-motive force entailed. Afterwards he discusses other details of distribution. The application of electrical energy is considered; and the relative merits of the arc and incandescent lights for various purposes are enumerated at length. Among the cautions with regard to even the incandescent light, we notice that contact of the globe with inflammable material—such as paper or curtains—is to be avoided; though the fact that such substances are easily ignited by this contact is not sufficiently generally recognized. In a typical instance, the author finds that light is six times cheaper by the arc than by the incandescent system of illumination. The question of continuous or alternating currents is a vexed one; but, on a majority of advantages, the palm is awarded to the continuous current for most purposes. Large central stations are deprecated on the score of their greater costliness of working

* "Der elektrische Strom als Licht und Kraftquelle," von Baumeister Hartwig. Dresden: 1894.

than a number of small ones; and it is shown that electrical supply companies using large central stations cannot compete for cheapness with large private installations. In all these cases, the conclusions are arrived at by comparisons of the actual figures obtained in working in several typical instances; and many of the results are tabulated for reference in a manner that reflects infinite credit on the compiler for the industry and care expended. Among other places, we notice Halle, Magdeburg, Dantzic, Hamburg, Leipsic, Chemnitz, and Frankfort-on-the-Main are treated; and particulars of the electrical installations there are given.

One point with regard to electric lighting which is often forgotten, is the indispensableness of gas or some other means of illumination to be kept in reserve; and we are glad to see Herr Hartwig allude to it. The portion of the book strictly devoted to electricity concludes with a useful abstract of the contents of the early chapters. We then come to the before-mentioned appendix on the incandescent gas-light. Our readers are well acquainted with the economy of incandescent gas lighting, and the principles involved; and the composition of the mantles has often been laid before them in the columns of the JOURNAL. To the exhaustive treatment of the subject in the book before us we need not refer, except to commend the chapter to the attention of those who are hesitating between gas and electricity. Herr Hartwig draws the following conclusions with regard to incandescent lighting by gas: The mantles, on an average, emit three-and-a-half times as much light as the 16-candle incandescent electric lamps during the period of their efficiency; and the life of a mantle is virtually coextensive with that of an electric glow lamp. The incandescent gas-light develops three-and-a-half times the heat of the electric light; but only one-fifth that of an ordinary gas-light. The electric light supplied from central stations costs six times as much as the incandescent gas-light; and the cost of its installation in a house is seven to eight times that of installing the latter system of illumination.

NOTES.

Paints for Ironwork.

At a recent meeting of the Association of Engineers of Virginia, Mr. S. Wallis gave the members some interesting and valuable hints respecting the protective painting of structural ironwork. He recommended that the first coat should be of red lead ground in raw linseed oil, used within two or three weeks after mixing, and kept thoroughly mixed while in use. This coat dries in from 24 to 30 hours. If the finish is to be black, the next two coats should be made up from a paste composed of 65 per cent. of pigment and 35 per cent. of raw oil. The pigment is to consist of 65 per cent, of sulphate of lime, 30 per cent. of lampblack, and 5 per cent. of red lead as a drier—the whole thinned to a proper consistency with pure boiled oil. If the finish is to be in red or brown, the paste should be composed of 75 per cent. of pigment and 25 per cent. of pure raw oil; the pigment to consist of 55 per cent. of sulphate of lime, 40 per cent. of oxide of iron free from sulphur and caustic substances, and 5 per cent. of carbonate of lime as a drier. The sulphate of lime is to be fully hydrated. At American prices, this paint will cost, ready for use, about 60 c. per gallon. Lead paints are not recommended for finishing coats, on account of chalking; neither is zinc, on account of cracking. Graphite paint does not dry well in linseed oil, and is not impervious to water. Its colour is steel grey.

The Screening of Heat-Rays.

Experience of the heating power of regenerative gas-lamps used in lighting low-pitched rooms lends interest to the statement that Herr Richard Zsigmondy has succeeded in producing a new kind of glass transparent to light, but arresting heat rays. This has been effected by introducing into the glass a small proportion of ferrous salts, which has the slight drawback of imparting to it a faint bluish tint. Glass so treated, tested in panes 0·332 inch thick, has been found to let through only 0·4 per cent. of the heat from a flat-flame gas-burner, only 0·72 per cent. of the heat from an Argand burner, or 0·73 per cent. of that from a lime-light. It permitted 12 per cent. of the heat of sunlight to pass through it, as against a transmission of 86 per cent. in the case of ordinary glass. The new product has now been named "schirmglas," which is German for screen glass. Herr Zsigmondy has been further prosecuting his researches into this question of screening out heat from light rays; and he finds that whereas a thickness of 0·38 per cent. of pure water will transmit 12 per cent. of the heat accompanying the light of an Argand gas-burner, various acid solutions slightly increase the proportion of heat transmitted. A colourless solution of iron in orthophosphoric acid, containing 5·6 per cent. of iron, brought down the proportion to 2·1 per cent.; while an almost colourless acidulated solution of green vitriol, containing 8·9 per cent. of iron, only transmitted 1·19 per cent. of the heat. It appears that the ferrous salts of iron are good absorbers of heat rays, and also that their efficiency does not depend on the chemical salt used, so long as the iron is present in the ferrous state, but on the percentage of iron in the solution. As to glass, neither alumina, nor lead, zinc, baryta, boracic acid, nor an excess or deficiency of alkali, has any marked influence on its absorptive power for heat rays, so long as it remains colourless. Most of the ordinary descriptions of glass, even when strongly coloured, will transmit at least 50 per cent. of the heat received upon its surface, and almost all the lamp-glass in common use transmits 60 per cent. and upwards of the heat.

Waterproofing Masonry.

A recent number of the *Engineering Record* gives a detailed description of the manner in which a new tall office building in New York has been treated with paraffin wax for the improvement and preservation of its exterior walls. The work is done by two men on a suspended painters' stage. The wall surface is first heated by stoves, which are essentially sheet-iron boxes 24 inches square and 4½ inches thick, having one of their larger sides closed only by a netting of ¼-inch wires. These stoves hang freely from a light chain, and are filled with burning charcoal, which, when the open side is opposed to the wall surface heats it sufficiently in from five to ten minutes. The paraffin is kept melted over a charcoal fire at a temperature of about 150° Fahr., while the wall surface is warmed to about 180° Fahr. to receive it, and is afterwards treated to a brief roasting to about 200° Fahr. The common hard bricks absorb a variable quantity of paraffin proportional to their porosity and temperature; the average absorption being about 2 lbs. per square foot. Parts of the wall inaccessible by the heating stove, mouldings, cornices, and so forth, are heated by the ordinary painters' blow-lamp. A little creosote is added to the paraffin, to prevent vegetable growths. Inasmuch as the wax is caused to penetrate into the masonry, where it sets when it reaches a depth at which the superficial heating has not raised the temperature of the brick or stone above its own melting-point, it is claimed that the treatment is hardly visible from the outside, while it renders any wall perfectly and permanently impenetrable by moisture.

Kernot on Wind Pressures.

Professor Kernot, of the Melbourne University, has read a paper on wind pressures before the Australasian Association for the Advancement of Science. The author referred to the great inconsistencies appearing in engineering and architectural practice with regard to the wind bracing of exposed structures, and to the great variation in the anemometric results published by meteorological observatories. Some of these have recorded pressures, or velocities corresponding to pressures, of 90 or 100 lbs. per square foot, while others report results only one-third as great. It was pointed out that these latter results correspond fairly well with common experience of railway carriages and chimneys, great numbers of which would overturn with pressures of not more than 30 lbs. per square foot, and yet, as a matter of fact, do not overturn, and are publicly regarded as perfectly safe. Professor Kernot has conducted experiments which tend to show that wind pressure varies with the square of the velocity; but he admits that further tests on a greatly extended range of velocities are needed. He has also devised an apparatus for determining the relative pressure of the wind on flat and curved surfaces of different figures. The apparatus consists of a screw propeller revolved in a tube at high velocities by means of a gas-engine. In this way it was ascertained that the ratio determined by Stoney between wind pressure on the flat and on sloping surfaces, such as a roof, is just; but it was also found that this result applies only to roofs supported on their columns, under which the wind can blow freely. When the roof was placed upon a wall, as in an ordinary building, the wall deflects the current upwards; greatly reducing the pressure upon the roof. If the wall is provided with a parapet of ordinary proportions, this effect is still more marked; the pressure being reduced to one-third of what it would otherwise have been. Experiments were made with the wind blowing in at the open end of a building having the sides and the other end completely closed; and it was found that the internal pressure tending to lift the roof was equal to that of the wind upon a flat vertical surface. The pressure upon one side of a cube was found to be 0·9 that on a thin plate of the same area. A lattice work in which the area of the openings was 55 per cent. of the whole area experienced a pressure of 80 per cent. of that upon a plate of the same area. The pressure upon cylinders and cones was proved to be equal to half that upon the diametral planes, and that upon an octagonal prism to be 20 per cent. greater than upon the circumscribing cylinder. A sphere was subject to 0·36 of the pressure upon a thin circular plate of equal diameter. When a plane surface parallel to the direction of the wind was brought nearly into contact with a cylinder or sphere, the pressure on the latter bodies was augmented by 20 per cent. In conclusion, it was recommended that 20 lbs. per square foot should be taken as the maximum wind pressure upon areas of not less than 300 square feet, and 30 lbs. for smaller surfaces in positions of full exposure.

Mr. J. B. Fenwick, the Engineer of the Retford Corporation Gas and Water Works, has had his salary advanced by £50 per annum, on the ground that his services have resulted in much economy.

Society of Engineers.—At the meeting of this Society on Monday next, Mr. R. Nelson Boyd will read a paper descriptive of "A Deep Boring near Freistadt, Austria, by the Canadian System."

TECHNICAL RECORD.

INCORPORATED INSTITUTION OF GAS ENGINEERS.

The Programme for the Forthcoming Meeting.

As has been already intimated, the annual meeting of the Incorporated Institution of Gas Engineers will take place on Wednesday, Thursday, and Friday of next week—the first two days at the rooms of the Institution of Civil Engineers; while the third day will be devoted to a visit to the Reading Gas-Works and a steam-launch excursion on the River Thames from Reading to Maidenhead.

On the first day, the chair will be taken at 10.30 a.m., when the following report of the Council (signed by the retiring President, Mr. John Methven, and the Secretary, Mr. Thomas Cole), will be presented, accompanied by the statement of accounts:—

In presenting its fourth annual report, the Council has again to congratulate the members on the progress the Institution has made during the past year. Not only as regards membership has this progress been steady and continuous, but the financial position of the Institution has been more than maintained; and the Council has been enabled to invest the surplus funds at its disposal in accordance with the Articles of Association—thus forming the nucleus of a reserve fund which it is hoped will grow year by year.

As regards the admission of students to the many privileges that the Institution affords, the Council would again urge upon the members the desirability of thus attaching the interest of their pupils and others in its well-being.

The Council has been greatly encouraged by the success which has attended its efforts to make the annual volume of "Transactions" something more than a record of the meetings of the Institution. This is shown not only by the satisfactory increase in the sale of these volumes, but also by the expressions of approval which have been made as regards the value of the plates of working drawings and the accompanying descriptions which have been kindly furnished by many of the members. The Council considers that the third volume of "Transactions" will be found quite equal to the high standard of the previous issues.

By the painstaking efforts of Mr. Cripps, a bibliography of gas literature has been compiled, which it is intended to incorporate in the next yearly volume. This, the Council feels, will be of very great value to the gas engineering profession.

The autumn meetings afford members a second opportunity yearly for the interchange of ideas, as well as visiting works of interest. The Council will endeavour to make these meetings as interesting and instructive as possible, and trusts that the members will, by their attendance, show their appreciation of the advantages thus afforded them.

The formal report of the Scrutineers as to the election of new members will then be taken; and afterwards Mr. Alfred Colson, M.Inst.C.E., of the Leicester Corporation Gas-Works, will deliver his Inaugural Address as President of the Institution. The remainder of the morning sitting will be occupied by the reading and discussion of a paper by Mr. George Livesey, entitled "The Relations of Capital and Labour in Gas-Works." In the afternoon, two papers will be read—by Mr. S. Meunier, on "Gas-Works Extensions in Stockport," and by Mr. Bryan Donkin, on "The Comparative Merits of Gas and Steam Engines." The day's proceedings will conclude with a dinner at the Holborn Restaurant.

On Thursday at half-past ten o'clock, the reading and discussion of papers will be resumed. The first two papers to be considered will be by Mr. Frank Livesey and Mr. J. Tysoe, the titles of whose communications will respectively be, "A Comparison: Stoking Machinery or Inclined Retorts," and "The Foulis-Arrol Stoking Machinery at East Greenwich." The remaining papers (four in number) are on somewhat cognate subjects: "The Enrichment of Coal Gas," by Mr. J. Ferguson Bell, of Stafford; "The Peebles Oil-Gas Process as worked at St. Helens," by Mr. Samuel Glover, of St. Helens; "The Introduction, Development, and Practical Working of the Oxy-Oil Gas Process at Huddersfield," by Mr. W. R. Herring, of Huddersfield; and "The Relation of Carburetting Water Gas to the European Gas Industry in 1894," by Mr. A. M. Paddon, of the Beckton Gas-Works.

On Friday morning, the members will leave Paddington Station (Great Western Railway) by the 10.5 a.m. train. At Reading they will be met by the Chairman, and by Mr. E. Baker the Engineer and Manager of the Reading Gas Company, and the new gas-works will be inspected. The first sections of these works were commenced in 1886, and have since completion been in use in conjunction with the old works, which are, however, now being abandoned. The second section of the new retort-house and settings is in course of construction at the present time. The site upon which the works stand was formerly subject to the winter floods of the Rivers Thames and Kennet (over 3 feet deep); but the land, about 12 acres in extent, was raised by the Company—partly by dredging from the rivers and by cart tips and earth from the necessary excavations—to its present level, which is well above the highest probable flood-line. The site is a valuable one, affording access to three lines of railway running into Reading, and to two rivers, the Thames and the Kennet—the former affording water conveyance to London, and the latter to Bristol and the West of England. The coal supply enters the works by a high-level viaduct. The rails run direct into the retort-house and coal-stores; while a set of low-level lines accommodates the general traffic and other requirements of the Company. The coal waggons are unloaded by steam power, and their contents shot directly into the coal-breakers. The coal is then elevated into the high-level hoppers, whence it falls into the hoppers of the stoking-machines in the usual manner. Regenerative furnaces are used throughout the works; and the retorts are built up of sectional pieces. The purification is principally by lime, but some oxide of iron is used; the gas being kept well within the 20-grain limit. New sulphate of ammonia plant has just been erected.

After luncheon, steam-launches will be ready alongside the works to convey members to Maidenhead—the luncheon and water excursion being arranged for by the Reading Gas Company. Tea will be served on board the launches; and Maidenhead will probably be reached in time to join the train due at Paddington at 8 p.m.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

The Papers and Discussions.

To-day we complete our record of the proceedings at the meeting of the above Association on the 17th ult. by giving the papers read by Mr. Alfred Thomas, of West Cowes, and Mr. D. Irving, of Bristol, and a report of the discussions which followed them and the communication by Mr. G. J. Gough, which was published last week.

Mr. THOMAS's paper was as follows:—

RETORTS AND CHIMNEYS.

When requested by Mr. Sainsbury, your Secretary *pro tem.*, to assist the Association by preparing a short paper for this meeting, he reminded me that managers of small works, as well as those of large ones, might introduce a subject worthy of description or debate. Though the preparation and discussion of papers is rather out of my line, I shall endeavour to say something upon retorts and chimneys; being the results of practical experience during the past twelve months at Cowes.

At the Cowes Gas-Works we had seven beds of five retorts, the arches of which had been up about twenty-seven years—too long, in my opinion, by at least seven years. These arches had sunk in the middle, and also appeared as though they were falling over into the retort-house. We had noticed for several years that the hydraulic main and ascension-pipes were coming over; and the former, being of cast iron bolted together for four beds, was weighty and unevenly supported. We were afraid the flanges would break and empty the main, and so unseal the dips. This actually occurred, for one of the flanges did break, and let the tar run down the front of the bed—quickly igniting, and becoming one mass of blaze. This made it most difficult to deal with; but we managed to put on a D-clip with cement and chips of wood. This, with a receptacle to catch the leaking tar, enabled us to go on for a time, though we evidently had not come to the worst; for before we reached Christmas, a cry was raised that the works were on fire, and the men ran out of the retort-house in alarm. It appeared that another flange had broken about nine o'clock at night; the stokers then being in the mess-room across the yard. The tar and liquor had run out and flooded the place; and by the time they discovered it, the escaping gas had ignited, and the house seemed one mass of flame. Our first work was to shut off the valves, and prevent the gas from coming on us from the holders; then to strike the retort-lid, and set to work with another clip. When this was done, we refilled the hydraulic main, and began work again. We had a very narrow escape of putting the town in darkness.

Matters had become so serious, that my Directors felt that something must be done; and this "something" meant the rebuilding of the retort-stack. The ironwork, being obsolete, was of no further use; and so an entirely new stack was decided upon. At first it was thought that the foundation had given way, as everything in Cowes is "going to sea;" and the question arose what was best to be done. I must mention that the retort-house was built upon mud land taken in from the river; and the concrete foundation (put in by our friend Mr. T. Giles) was 14 feet deep. I communicated with him, and he kindly gave me all the information he could upon the matter; but he assured me that the fault could not be in the foundation, and that I must look in another direction for the cause.

Soon after pulling down, the cause of the stack falling was discovered. The tie-bars from the front to the back had been built in the brickwork, and they were burnt through; and the weight of the hydraulic, together with the H and ascension pipes, had been too much for the old arches, which had parted in the middle, and so gave rise to all the trouble. A glance at the photograph upon the table will, I think, satisfy anyone here as to the cause. I showed it to a gentleman (not a gas man), and he asked me if it represented some old Roman ruins. I can assure you, Mr. President, that we all thought these "old ruins" would not hold together until some new retorts were ready. It is said that "Fortune favours the bold." She favoured us, at any rate, whether we were bold or otherwise;

for they did hold on until three arches were built, and two sets of sixes were got to work. We then began clearing away the rest of the old stack, which, if anything, was even worse than the first portion.

In place of seven beds of fives, we have erected six beds of sixes; or, rather, we built the arches for sixes, but put only four in one arch, leaving the two bottom ones out. We have all new mouthpieces, H, and ascension pipes, and separate steel hydraulic mains to each bed, with 6-inch flood-gate valves at the back, leading into a new foul main. The buckstaves are of steel 6 in. by 1 in.; two of these being put together with ¾-inch bolts, and pieces of 1-inch pipe 6 inches long between them. These rise 2 feet above the brickwork; and the same sized bars are carried horizontally across to those at the back. Upon these the foul mains and the hydraulics rest.

Then came the question of chimneys. We had one large chimney, which I was anxious to do away with, if possible, as it was evidently "going to sea." So for the first bed we carried up a small chimney a few feet through the roof—running a flue from this to the second bed, but not connecting it; and for the second bed we ran up a 9-inch chimney about 4 feet high. This was found too small, but not too short; so we connected it with No. 1. For No. 3 we built a single brick chimney 14 in. by 14 in. and 3 ft. high. This did its work well; so we have adopted this size for all the beds. These short chimneys are not by any means a new thing, but are simplified. To prevent the heat from injuring the roof tiles, we have riveted two sheets of iron together, side by side. These are suspended over each chimney, and are set at the same pitch as the roof. The fumes from the chimneys play upon them, and pass out at the ventilator. I should not recommend this plan in the case of a wooden roof upon a retort-house. I am glad to find there are but few of these remaining; and the sooner they are replaced by iron ones, the better for the proprietors. It is not very pleasant to have a roof burnt off in winter; and had ours been of wood, it would most assuredly have been down.

In my opinion there are several objections to high chimneys for retort-stacks. In the first place, they are costly; secondly, there is often too much draught on the near benches, and too little on those farthest away. Then the necessary repairs are very costly, as they are mostly required at the top; and there is the danger of pieces of the cap coming down, as in the case of Widnes, where a large foul main was broken, which nearly caused the town to be put in darkness. With regard to short chimneys, I think there are several things in their favour. They are inexpensive (their cost is less than 10s.), no main flues are required, and each bench is independent of the others, and has an equal draught upon it. Besides this, there is decidedly less cut on the sides of the furnaces.

In these retort-settings, we have a single secondary air supply. Horizontal flues are run to and fro under the bottom flues, taking in the air at the back and leading it to the front. It is then carried up a vertical flue behind the furnace linings, and delivered into the furnaces on top of the coke on either side.

I will now give you a few particulars as to cost of the alterations; including taking down the old beds, new material, the carriage of all goods, and labour, mechanical and otherwise. We obtained seven tenders for the ironwork. The price for castings, including the cost of patterns, was 7s. 9d. per cwt. delivered; and for ¾-inch steel hydraulics, 18 in. by 15 in., and 8 to 10¾ ft. long, tested and delivered, £10 17s. 6d. each. The erection of the arches and the setting of the retorts, including the main flues or short chimneys, was let for £82; being £8 per arch and £1 per retort. The total cost of the change was £704 10s., or about £117 per bed of six retorts.

Discussion.

Mr. J. Lowe (Weymouth) said he had thought he knew something about short chimneys; but, after what Mr. Thomas had stated, his chimneys turned out to be tall ones. But with regard to short chimneys in the ordinary acceptation of the word, he might say that some eight or nine years ago, he decided to erect short chimneys in substitution of a tall one, for the reason that the old chimney was in a dilapidated condition, and one of its side walls formed part of the wall of the engine-house, rendering it somewhat inconvenient by heat and so on. There were only three settings in this particular section of bench; but the construction of the roof somewhat interfered with the putting up of three chimneys. The chimneys were built solid from the ground up to where the flue entered from the setting. They were 14-inch flues, built square to about 2 or 3 feet through the roof, and finished off with a moulded cast-iron cap. They ran to something like 18 to 20 feet above the top of the setting; so that his short chimneys were really tall ones. Their cost was £3 each; the Company finding the material. These chimneys gave most complete control over each setting; so that, if anyone wished to introduce the regenerative system, or tar firing, perfect control could be obtained with them. If the section to which he referred had been one of four settings instead of three, he should probably have built two chimneys, instead of one to each setting. He remembered an instance where the proprietor of a small works with a tall chimney, was in a dreadful fix, having all his retorts under fire, and yet could get no gas. On visiting the works, he (Mr. Lowe) saw at once, the difficulty was either in the setting or in the chimney; but, not being acquainted with the detail of the setting, he determined to try an experiment. He had an ordinary length of 12-inch cast-iron pipe temporarily fixed up in one corner to relieve one of the settings; and, in a very short time, the gasholder began to rise. He erected a short chimney; and within a week half the settings were idle. A second short chimney was also put up; and since then there had been no trouble. He also referred to the satisfactory experience with short chimneys at the Dorchester Gas-Works; and he described the chimneys erected by Mr. Ineson at the Ventnor Gas-Works. These, he said, were built of 4½-inch fire-brick, with angle-iron at each corner; and they were carried a few feet through the roof. Mr. Ineson was obliged, from structural considerations, to build the chimneys on a portion of the arch; so that it was of the utmost importance that it should not be overweighted. He believed Mr. Ineson estimated that these chimneys cost £1 a setting during the duration of the setting. In his opinion, the days of tall chimneys were numbered.

Mr. J. J. Jervis (New Swindon), speaking from an experience of over 18 years, testified to the advantage, in a medium-sized works, of having a short and separate chimney for each bed of retorts. He had eight beds of five single retorts; each bed having its own chimney, with a 9-inch square flue. The chimneys projected about 5 feet above the roof; and the total height was not more than 25 feet. With these they could adjust the draught very much better than with taller ones; and any leaking retort not noticed and stopped by the stoker was "reported" by the chimney top. With tar and creosote firing, a view of the top of the chimney of the bed in operation was of great service, as it assisted them in regulating the supply of the liquid. He remembered once visiting the Windsor Gas-Works, and seeing there a setting of retorts without a chimney; and Mr. Wadeson told him that it heated to the best advantage. For some reason or other, the bed would not heat by its flue into a common stack; but on being cut off for inspection, and having free vent on the top of the bed, it did its work well.

Mr. S. W. Durkin (Southampton) thought one of the chief points in the paper had been missed. It showed them they ought to avoid building the tie-bars in brickwork that got red-hot. The former Engineer of the West Cowes Gas-Works was not singular in building his tie-bars in the brickwork, because he (the speaker) knew that some years ago they were built in the brickwork at Southampton, and were all burnt through. When, however, iron retorts went out of use, and clay retorts took their place, very careful bracing was provided external to the brickwork, and that had continued ever since.

Mr. R. O. Paterson (Cheltenham), having been invited by the President to join in the discussion, said he wished, in a few words, to emphasize the fact which Mr. Thomas had very fully demonstrated in his own experience, as to the absolute benefit to be derived from the use of short chimneys upon retort-stacks. In using the words "short chimneys" one, of course, was speaking figuratively, and meant a chimney that was very much shorter than the old-fashioned retort-stack. Going as far back as the days of Mr. Spinney, they had had short chimneys at Cheltenham, which only passed through the retort-house roof; so that they were not by any means new things. His predecessor, Mr. Esson, continued the principle; and he (Mr. Paterson) was thankful to say he was wise enough to follow in their lines. But, of course, the conditions had altered somewhat. They did not put up anything like so large chimneys as in those days. They had introduced regenerative furnaces; which did a great amount of work. They had only one furnace to a through bed containing 16 mouthpieces; and three of these arches worked on a small chimney at the end of the stack. They did nothing more than put up 4½-inch brickwork, 14 inches square in the clear, and took it through the slates of the roof. They could make about 390,000 cubic feet of gas a day per chimney. This was another illustration of the want of full appreciation of the requirements of the case. In the olden days, they had a condition of things which made it necessary to have a considerable draught to get the air through the furnaces at all; but with the new forms of furnace such a large draught was not required.

Mr. J. Griffin (Fareham) observed that at his works he had two chimneys—a short and a tall one. The latter, he feared, would soon fall down; and he had been rather exercised as to whether or not he should put up in its place a short chimney to each bed. The paper and discussion had decided the point; and he should do this. It saved a lot of time; and they had not a very good foundation at Fareham, so that he should build them on the top of the arch (which was 9 feet long), and then carry them through the roof.

Mr. W. J. Fuller (Bournemouth) said it might possibly be useful if he mentioned that at his works they had formerly a very large middle stack to eight beds; but owing to the bench settling down in the middle and other accidents (which would happen with clay retorts), the draught was very much impaired. In consequence of this—the stack being in the middle of the eight—it was found necessary, for the benefit of the extreme end settings, to provide other means of draught. For this purpose, they erected No. 12 B.W.G. wrought-iron shafts to each of the end stacks; and they found this a simple method of getting the fumes up through the roof. The success of these experimental shafts was so great that they did away with the central stack—entirely confining its use to the two middle beds, and giving each of the other settings a separate stack.

Mr. T. GILES (Bridport) stated that he was the builder of the retort-settings at West Cowes which were referred to in the paper. He had to erect them on mud land, which had been reclaimed from the sea; and the foundations were 13 feet deep, with some 7 or 8 feet of concrete under them. He did not think there was any fear of the foundation giving way, because it was one mass of concrete the whole length of the settings. He had noticed, however, that there was a tendency to topple over towards the water; and he attributed this to the land being a little softer near the water than farther away. There was also an indication of the chimney going over. It was, however, most extraordinary land to build upon; and he took every precaution he could. As far as tie-bars were concerned, he believed that at the time these retorts were set, it was the usual custom to put them through the wall. They could not be burnt out, because they were put through the partition wall between the two ovens, where they could not get red hot. With regard to short chimneys, he had found them answer admirably.

The PRESIDENT remarked that the discussion had been a somewhat interesting one. With regard to tie-bars, he believed, although in early days it was the general practice to build them in the brickwork, it had now become the plan to have them outside. At Salisbury, they preferred to have two uprights of rolled girder, or better still, old railway rails, with a cross piece on the top to carry the hydraulic. These old rails made the strongest and cheapest form of retort bracing that they could have. With regard to the ends, they put two or three uprights, and tied them across the top with tie-bars. As to the remarks which had been made on the subject of chimneys, it was most interesting to hear that they could be supplied so cheaply; but it must be remembered that they could not all do with short chimneys, because in some cases they had to consider the distribution of the fumes. On two sides of the Salisbury works, they had occupied-land that was rather higher than the works; so that, if they were to try 4-feet chimneys, they would have no end of complaints as to the foul gas. They had, however, come down to one chimney to every three beds. The chimneys were built round, with a section of retort or drain pipe in them. One of these chimneys was 18 inches at the bottom and 15 inches at the top; and it gave a pull on the furnaces equal to ½ inch of water. Some of the very highest chimneys would not do more than 4-10ths; but this would pull 5-10ths. This was not the highest chimney on the works; but it gave the best results. Referring to the question of cracks in chimneys, and the admission of cold air by them, he said that he believed in a hot chimney. The chimney did not last so long; but if they wanted a good draught and an economical fuel account, they must have a hot chimney.

Mr. THOMAS, in reply to the discussion, said he did not make any claim for short chimneys; he had merely simplified them. His chimneys were 3 ft. 3 in. in height; and they were built on the top of the bed over a square hole that came through the arch. He might mention that there were only 106 bricks in each chimney; and that the stokers erected them. There was therefore no weight which would hurt the arch. When he started the third chimney (which was 14 in. by 14 in.), it was 3 ft. 3 in. high; and he kept taking brick by brick off, until he brought it down level with the foul main which ran alongside it. He should have taken it a little lower; but he thought the heat on the foul main would do some damage. As to the question of fumes, he assured the President there were no perceptible fumes. At night time they could just see a sort of blue flame issuing from the top of the chimneys.

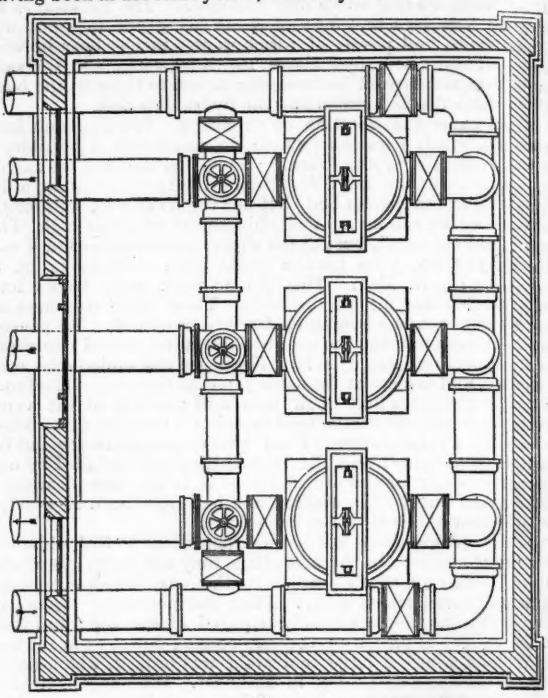
Mr. D. IRVING next read the following

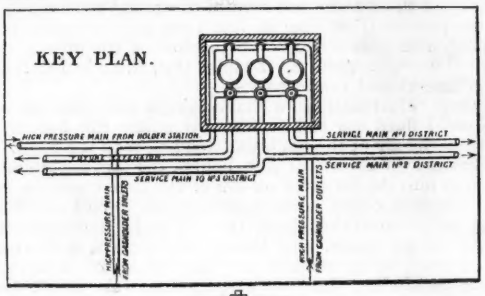
SHORT DESCRIPTION OF THE STAPLETON WORKS GOVERNOR-HOUSE.

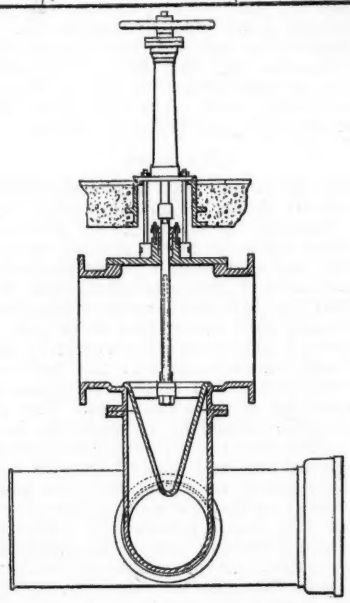
In giving you a short description of the governor-house erected by the Bristol Gas Company at Stapleton, permit me to explain that I do so only at the very urgent personal request of your esteemed President, who has several times seen the work, and not that it is thought the arrangement or construction possesses any special new feature or merit. But possibly it may afford some suggestion; and thus be of service to members of this Association who may be engaged upon similar work.

The arrangement of a governor-house, and the maintenance of a regular and uniform pressure, is a subject of the greatest importance in gas distribution. Too great attention cannot be given to the object of providing a steady, regular pressure, so that, with proper fittings, the consumer may obtain the best possible results from the gas which he purchases, free from all the annoyances caused by lights suddenly flaring up, blackening ceilings, and rendering the atmosphere of rooms stuffy and unbearable; or, in the case of too little, or falling pressure, reducing the consumer to semi-darkness, and that always just at the very moment when he needs a good light, or it may be a good supply for cooking. A learned Bishop has stated that good cooking tended to godliness; and a good regular supply of gas, at a steady pressure, is essential to good cooking.

The employment at the present day of large holders, and the resulting variations of pressure given by the several lifts, together with the varying requirements of manufacturing districts, all make demands upon the efficiency of the station governor. Simple as the operation of this governor may appear, it is no easy matter to secure that perfect control which is desirable. I have repeatedly seen governors give a variation of 5-10ths or 6-10ths, or even more, caused by the reduction or increase of the initial pressure, incidental to the cupping or uncupping of the gasholder. In small or medium sized works, where circumstances would permit, I know of no better arrangement than that designed by Mr. Frank Mead, and erected at Sutton; but any such plan was quite impracticable, and also unnecessary, at Stapleton. The governors employed at Stapleton are not new, having been in use some years; and they are old fashioned.




KEY PLAN.
HIGH PRESSURE MAIN FROM HOLDER STATION
SERVICE MAIN No1 DISTRICT
EXHAUST
SERVICE MAIN No3 DISTRICT
SERVICE MAIN No2 DISTRICT
No3 PRESSURE MAIN FROM GASHOLDER INLETS
HIGH PRESSURE MAIN FROM GASHOLDER OUTLETS



The site of the Stapleton works occupies some 28 acres, and is in many respects well chosen. It is bounded on the south by the Great Western, and on the north by the Midland Railway Companies; and upon the east and west by public roads, each leading into widely separated centres of consumption. The erection last year of "high," "middle," and "low-level" railways, for the transport of large quantities of material and residuals to and from the works, and the rearrangement and extension of

the railway-sidings, rendered it necessary that the governors and service-mains, which had hitherto been somewhat scattered, should be concentrated into one convenient place. The site selected for the governor-house is at the south end of the works, just about mid-way between the two public roads named.

In determining the size of mains for inlets and outlets of governors, due care and consideration was given to the present and probable future requirements of each district, and also to the initial supply to the governors. The supply to the governor-house is taken from the outlets of the holders. You will notice from the drawing before you that there is also another supply, which is taken from the high-pressure main connecting the inlets of the holders with the outside holder stations, and also with the other works of the Company; so that practically there are three distinct sources of supply to the governor-house.

The service-mains running east and west have been kept carefully clear of all existing, and all probable future, extensions of buildings and manufacturing plant. The bye-pass, you will notice, is a three-way valve, and, as first designed, had simply a disc. The cone, which is perhaps a novel feature, and admits of almost perfect control of the flow of gas, was the suggestion of Mr. William Fiddes, in consultation with whom the whole of the work was designed.

Either governor can, in case of need, supply one or more districts; or each and all districts can be supplied through the bye-passes, quite independent of the governors. The arrangement affords a supply from the holder-outlets in the ordinary way. In case of any accident, alterations, or repairs being required to the holder-outlet valves or mains connecting the governor-house, the other supply from the inlets of the holders comes into action; and in the event of both failing, or under any circumstances requiring to be shut off, the governors can be supplied from any of the outside holder stations, or from either of the other manufacturing stations. In a like manner, gas can be supplied from Stapleton to any other station of the Company.

Discussion.

Mr. W. Sugg (London), on the invitation of the President, said that with regard to this question of governors, Mr. Irving had remarked that there was a difficulty in getting over the changing of the gasholders. This was one of the greatest difficulties where they had governors on the works, and took the supply direct from the gasholders. Then the pressure of the gas inside where the cone was working would generally take so much weight off the cone that the governor would shut up, and give less pressure. It was very rarely they found a good governor giving any variation of pressure any other way—it was mostly in the lesser way. In cases where there was a considerable quantity of gas and then a small quantity being taken, it was a very trying thing for a large governor. One method of getting over this (he did not know whether he was the deviser of it) was to put a smaller governor alongside the large one; so that in the daytime the small governor did the work, and, when a higher pressure of gas was demanded, the larger governor came into action, because, as soon as the small one had done as much as it could, the larger one must come into play. This overcame one of the great difficulties of the governor; and the other difficulty was to get over the question of the pressure shutting up the governor. This was done now by using valves fitting almost tightly into their seats—something like the cylindrical slide-valves of engines, only, instead of being made cylindrical, they were made with a number of teeth. A small governor for the day pressure and a large one to take the heavier pressure at night time had always answered well; and in this way they did not find any trouble with the governor changing its pressure. Another way of doing it was to have a double governor—one governor to take the gas as it came from the gasholders, and regulate it down to the highest pressure that would be required. This prevented any variation on the other governors, because the slightest variation would be thrown on the first governor.

Mr. Frank Wright (London) was also invited to speak. He said that he had not intended to say anything on this subject, because it was one that was almost unknown to him. Some years ago he designed a great number of governors; but he had to design them upon the ordinary rules of long cones and big gasholders. He must say that from his earliest days, he thought the smallest amount of gas that could be made to actuate a valve would be the best system upon which to work. He observed here—and it was about the second time he had noticed it—a system shown of secondary regulation by means of the cone valve. He did not know whether Mr. Irving was aware of the arrangement in use at Liverpool. He (the speaker) thought it was Mr. William King who first brought the system under his notice; and it was one where they could use a small governor and a large valve. This seemed to him (Mr. Wright) to be an admirable idea. As they must have a man to look after the distribution of the gas, he could very easily from time to time throughout the evening operate this secondary valve. He was quite aware of the great difficulty that the cupping and uncupping of gasholders caused. He had in mind a case where a 36-inch governor was made with an immense large gasholder; and therefore it required a considerable quantity of gas to operate it. About the time this governor was made, it was the fashion to put in safety-plates with small holders. In the instance, however, to which he referred, the people had erred on the side of safety; and the governor could not possibly act unless they gave it time. He remedied this by removing the conical valve, and putting in a throttle-valve.

Mr. Irving said his task of replying to the discussion was an easy one. As he had explained, it was only the simple arrangement of governor and bye-pass valve which could possibly be of any interest. It was not intended that this bye-pass valve should be used as a secondary valve when the governor was in action. At one of their stations, however, they had in use a valve which was something similar to what Mr. Wright had explained—a valve which was to be supplementary to the governor. But in that case the governor was not large enough; and the valve was put in as an auxiliary to maintain the supply over the district. The system of using small governors in the way that had been mentioned by Mr. Sugg was, he believed, in use at several places.

THE PREPAYMENT METER SYSTEM.

Mr. G. J. Gough then read his paper on this subject, which was published in last week's issue (p. 757).

In the course of the discussion which ensued,

Mr. T. W. R. White (Sherborne) stated that he had a few prepayment meters working upon the lines indicated by Mr. Gough, and testified to their value in supplying gas to doubtful customers. The meters paid the Company very well. Only that morning he saw a list of nine small houses in which these meters were fixed, and which yielded £4 11s. 8d. last quarter, and one of which registered a consumption of 6000 cubic feet. A little extra was added to cover meter-rent. In their case they charged a net price of 3s. 11½d. per 1000 cubic feet; and the meters were set to give a certain quantity—the meter-rental being added at the end of the quarter. They adopted this plan because the prepayment consumers objected to pay any more for the gas than the ordinary class of customers. Perhaps there were houses in Calne from which Mr. Gough could show a larger return, with the fittings on the hire system. But they had not many of that class of houses at Sherborne; and so they were confining themselves mainly to getting the prepayment meters into the houses of small consumers, and 5-light ones into those of larger consumers who gave them trouble in settling their accounts.

Mr. Irving congratulated Mr. Gough upon the success he had attained at Calne with the prepayment system. Here they had an example of the number of consumers being increased by 18 per cent. by means of an arrangement that was self-supporting and paid very good interest upon the outlay as it progressed. More than that, Mr. Gough had succeeded in increasing the consumption of gas by 5 per cent.; and he (Mr. Irving) thought he should be credited with even more than 5 per cent., because the exceptional sunshine of last year tended in most cases—it did in Bristol—to a considerable decrease in consumption. This was really undisputable evidence as to the benefit of the prepayment system, and as to what could be done where gas managers put their shoulders to the work.

Mr. Griffin remarked that at Fareham they had the electric light to contend with; and they had to look about in all directions to maintain the consumption of gas. There were a number of houses in the town with service-pipes laid; but the occupants did not consume gas. If, by offering them something in the way of a boiling-ring, they could get them to use gas through these prepayment meters, it would be a good thing. On his suggestion, his Directors did try one of the prepayment meters; but, after working well for about a week, it got quite out of order. Of course, being new things, people began to talk about these meters; and when this one got out of order, they would not have anything to do with them. It seemed to him that Mr. Gough had been lucky in getting hold of a reliable meter, and one that answered very well indeed. At Fareham they had only 400 consumers; but they had in use more than 100 cooking-stoves and some 60 of Siemens's and the Wenham Company's regenerative lamps. They had done all they could to combat the electric light; and he did not know of a town where the public lighting had been taken away from the gas company to the extent it had been in their case.

Mr. H. Sainsbury (Trowbridge) said he had adopted prepayment meters in order to meet the bad payers; and in this way they obtained the money where they would not otherwise have done so. Beyond this he found that, by only having to put pennies in the meter, the consumers were paying a good deal more than they did before—some of them, in fact, were using 10,000 cubic feet of gas per annum more than formerly. It was true there was a little difficulty with the meters. They did not always work smoothly; but this, he thought, would soon be overcome.

Mr. Gough, having thanked those who had joined in the discussion, said he wished to say that they—particularly Mr. White and Mr. Sainsbury—had lost sight of the object they had of adopting the prepayment meter in Calne. It was not to make the old consumers pay better; but it was to get new custom. They had a large number of small houses which both the owners and occupiers were quite unprepared to fit up; but by launching this venture of giving fittings for lighting and a boiling-ring in connection with a prepayment meter, he had proved that they had obtained a return on the outlay, and had been able to extend the consumption to the considerable extent shown in the paper. Mr. White had mentioned that he collected the

rent for the meter at the end of the quarter. Of course, one must vary the operations to suit one's particular district; but he did not think that plan would answer in his case. The consumers liked to know how much they had to pay, and done with it. Personally, he preferred to adhere to his present system of charging, as, although perhaps it was not quite so correct in principle as the other, the money was more easily collected. [Mr. WHITE: We collect the rent on inspection.] Then with regard to the meters he used, he would rather not mention the name of the makers publicly. He might say, however, that the meters did not give the utmost satisfaction. There were faults in them; but there had been nothing alarmingly wrong, and, on the whole, they were satisfied with their working. Occasionally they had a meter choked with coppers. A very surprising thing was that people whom one would imagine would never use gas, and would not be able to pay, were among the largest consumers. The greatest difficulty they had to contend against was the collection of the money; the collector having to take a big bag in which to carry the coppers.

Discovery of a Rich Coal-Field in North Notts.—A new coal-field is about to be developed in North Notts which promises to have an important bearing upon the prosperity of the district. Coal has been found in the neighbourhood of Misson, near the surface; and the seam is said to be of unusual thickness and of excellent quality. The London and North-Western Railway Company have, it is reported, offered to construct a line to tap this coal-field, which would run direct from Nottingham, Retford, and Misson to Hull.

Incorporated Association of Municipal and County Engineers.—The Yorkshire District meeting of this Association will be held next Saturday, in the Keighley Town Hall. The members will be received by the Mayor (Mr. S. Paget) and members of the Council. The Borough Engineer (Mr. W. H. Hopkinson) will read a short paper on "Sewerage, Sewage Farm, and Filter-Beds for Filtering Water for Town Supply;" and a visit will be paid to the sewage farm and filter-beds of the Corporation. On their return, the members will discuss the paper.

Books Received.—"Gas Lighting and Gas-Fitting." By W. P. Gerhard. (New York: D. Van Nostrand Company.) This is an amplification of the author's "Notes on Gas Lighting and Gas-Fitting" and "Hints to Gas Consumers;" and it has been issued, pending the publication of a larger work on the subject which he has in hand, to meet the demand for a small guide, written from an American standpoint. The book, which is small enough for the pocket, contains a translation, by the author, of the rules and regulations regarding gas pipes and fittings framed for use in the city of Munich.——"Potts's Mining Register and Directory for the Coal and Ironstone Trades of Great Britain and Ireland." (North Shields: W. J. Potts.) This is the sixth annual issue of this work, the scope of which has been noticed in the JOURNAL on previous occasions; but it has been slightly delayed owing to the strike of last year. The Directory has been enlarged; and several new features—one of which is the introduction of telegraphic addresses—have been added to the contents.

Presentation to Mr. Harrison Veevers.—In recognition of the personal esteem in which they hold him, and of the valuable services rendered by him to the Manchester District Institution of Gas Engineers, a number of the members of the Institution met at dinner a few nights since and presented an illuminated address and a purse of gold to Mr. Harrison Veevers, Gas Engineer and Surveyor to the Dukinfield Local Board. Mr. Veevers' recent marriage was considered a suitable occasion for such a presentation; and it was made accordingly, in the name of the subscribers, by Mr. J. Braddock, of Radcliffe, President of the Institution. The address, which was beautifully illuminated, was in the following terms: "Manchester District Institution of Gas Engineers. To Harrison Veevers, Esq., Past-President, Assoc.M.Inst.C.E. Dear Mr. Veevers,—In the name of the members of the Institution and a few friends, we respectfully present you this testimonial and the accompanying purse of gold, as a token of our hearty good will and esteem, on the occasion of your marriage. This is the 25th year of your membership of the Institution (of which you are one of the founders); and during that time you have occupied the positions of President, Vice-President, Treasurer, and Honorary Secretary. It is with pleasure that we refer to your valuable services in these capacities, as well as to your many contributions to the literary and technical work of the Institution. The assistance you have so willingly rendered to the younger members of the profession has been much appreciated; and we rejoice that an opportunity now arises for us to express that appreciation in a tangible manner. Our earnest desire is that you may ever retain the respect and confidence of your *confrères*; and that long life and prosperity, and a bright and successful future, may be yours.—JAMES BRADDOCK, President; GEO. SMEDLEY and ISAAC CARR, Vice-Presidents; THOS. NEWBIGGING, Treasurer; S. S. MELLOR, Hon. Sec.—17th April, 1894." Mr. Veevers acknowledged the kindness of his friends in a few suitable sentences, and short speeches of a congratulatory nature were delivered by Mr. G. Smedley (Buxton), Mr. Isaac Carr (Widnes), Mr. T. Duxbury (Darwen), Mr. D. Clarke (Ashton-under-Lyne), Mr. S. Haughton (Dukinfield), and others.

REGISTER OF PATENTS.

Gas-Engines.—Hartley, J. W., and Kerr, J., of Kilmarnock. No. 3971; Feb. 23, 1893.

This invention, relating to gas and like engines, is specially applicable to compound engines, and part of it is applicable to engines using weak gas—such as Dowson gas. The object of the invention is "to improve the action and effectiveness of gas-engines, by means of improvement in the details of operation and in the detail parts." The invention comprises: Improvements in the gear and methods of clearing out the products of combustion from the cylinder by air; a novel arrangement of tandem compound gas-engine; a method of, and device for, circulating the water in the water jacket of a gas-engine; a new arrangement of helical cam for controlling the admission of gas; a method of, and device for, controlling the air and gas supply when using weak gases—such as Dowson or producer gas; a method of increasing the available pressure in the low-pressure cylinder of a compound gas-engine, by admitting additional gas to the low-pressure cylinder; and an arrangement of governing gear for controlling the exhaust-valve of a low-pressure cylinder.

Coin-Freed Gas-Meters.—Anderson, J., of Edinburgh. No. 6086; March 22, 1893.

This invention in automatic coin-freed or prepayment gas-meters is shown by the accompanying illustrations—where fig. 1 is a longitudinal or side section of the upper part (broken away) of a dry meter, fitted with the improved mechanism; and fig. 2 is a corresponding plan view, with the meter-cover removed. Fig. 3 is an end elevation at right angles to fig. 1; and fig. 4 is a view corresponding to fig. 1, but looking from the opposite side of the meter.

Fig. 1.

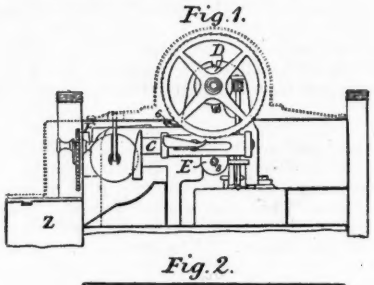


Fig. 2.

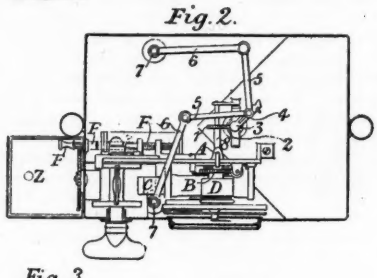


Fig. 3.

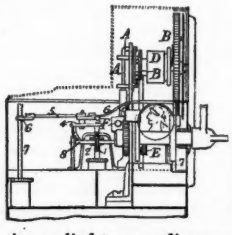
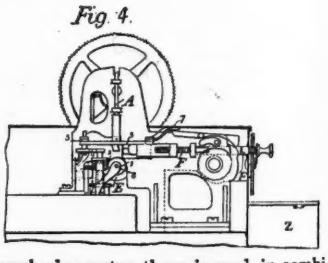


Fig. 4.



As applied to an ordinary supply dry meter, there is used, in combination with the improvements, the usual double-acting bellows, and the usual slide-valves, and rotating-spindle 3 with "tangent" 4 on top, connected in the head of the meter, through the links 5 and levers 6, to the upright rods 7 from the bellows; while a worm 2, on the spindle 3, turns a wheel 1 on the first-motion spindle 8 of the usual counting mechanism. The improvements consist, as shown (particularly in figs. 3 and 4), of a rising and falling vertical spindle A, carrying at its lower end a bell-crank stop-lever, fitted in the upper open chamber in the path of the usual revolving "tangent," so that, when the spindle and its stop-lever are down in their lowest position (as in figs. 3 and 4), they stop the "tangent" and action of the meter; but when the spindle rises, the meter goes on measuring gas through it as usual. The vertical reciprocating spindle of the stop-lever has a lateral arm (fig. 3) at its top end, which rests on a disc with a notch in it, so that, when the notch comes round, the spindle and lever fall, and at every other part of the revolution of the disc, the spindle is kept up and allows the meter to measure gas. The disc is secured preferably on a hollow spindle B, to rotate on a fixed central stud, carried on bearing-brackets projecting up from the box part of the meter. This spindle B has also a large ratchet-wheel keyed on it, turned by a weighted ratchet-pawl lever, fulcrumed on a stud or crosshead projecting out from a reciprocating-piston C, working in a horizontal cylindrical spring chamber; and the piston C, when pushed into its inmost position against the power of the spring by the action of inserting a coin, brings the pawl into action, and turns the ratchet-wheel a given proportion of its revolution. The spring pushes the piston C and the ratchet-pawl always back to a changeable normal position in the other direction; and it also takes the ratchet-pawl out of action ready for another or new action

inwards, and allows the ratchet-wheel to be turned in the reverse direction by the usual-acting mechanism of the meter.

The hollow spindle B also carries a screw friction-box D, with a spring or discs of leather or other suitable material in it, working against a friction-disc, secured on the hollow spindle B; and the friction-box D carries a toothed spur-wheel, working into a screw or worm on the top end of a vertical spindle turned by a worm-wheel at its lower end, working into a worm or screw E on the first-motion horizontal spindle 8 of the counting mechanism. The friction-clutch D and ratchet-wheel are turned back in the opposite direction by the usual acting mechanism of the meter, until the spindle A of the stop-lever falls into the notch again in the disc, and stops the action of the meter, as described. The outer end of the spring-actuated piston C has a curved crosshead, reciprocating in a groove in the middle of a barrel formed of a central spindle, and two discs, with a slot in these and through the spindle, for receiving a penny or other coin to act on the head of the piston. Any smaller coin would drop through the slot into the money-box, without actuating the mechanism. The spindle of this barrel passes outside the front of the meter-case, and carries a handle and pointer on it showing its position for receiving the coin, and the direction to turn the barrel. To ensure the handle and pointer being turned completely round, a weighted lever is actuated by a raised part on the circumference of the coin-drum, that will stop the action of the meter by means of its arm rising and coming into the path of the lever 6, and preventing its oscillation until the handle and pointer have been brought back to their normal position.

In action, the edge of the coin presses in the cross-head and piston C, to the desired distance, to actuate the pawl and turn the ratchet-wheel to the extent to measure the gas for each coin inserted; a ratchet-wheel being fitted on the barrel with a fixed pawl, to prevent its being turned in the opposite direction. A screw-spindle F is fitted near one side of the spring-barrel; and a piston C, with a milled finger head outside, has a pinion on it, working into a toothed-wheel plate, fitted on a stud centre also outside, but covered in by a portable case. This wheel-plate is divided on the face; and a stationary pointer is mounted in front of it, as shown on figs. 1, 2, and 4, so as to give an adjustment of (say) from 10 to 40 feet of gas for each action of the coin and position of the screw-spindle F. The inner end of the screw-spindle F adjusts a stop-bar, which takes against an angled projection on the crosshead, on the inner end of the piston C, so as to regulate the length of the outward stroke and normal position of the piston, and at the same time tilt the pawl out of action, to give the 10 to 40 cubic feet of gas for each coin inserted through the slot.

The hollow spindle B of the ratchet-wheel has a pointer on it, in front, working over a circular dial, as shown in fig. 2, divided to indicate (say) 500 cubic feet in the circle. Any fixed number of coins may be inserted consecutively after each other through the slot that would give any less number of feet of gas in the revolution of the ratchet-wheel; and the dial would indicate the volume of gas paid for and to be consumed. To prevent the complete rotation of the ratchet-wheel, a portion of it is left uncut; and when this uncut part comes over the weighted ratchet-pawl, the latter slides along, and the further rotation of the ratchet-wheel is thus stopped. A disc is secured in front of the ratchet-wheel by lateral pins, and would come into exposed action when no more coins ought to be inserted—that is, before the wheel and its spindle B have made a full revolution. The disc would have printed on it the words "No more coins to be inserted," or some similar device; and it would show through a segmental slot in the front plate, below the dial. The turning of the wheel backwards would permit the passage to the consumer of the prepaid gas for the number of coins inserted; and the measurement of it would be indicated on the ordinary counting mechanism. When the pointer returns to zero, it will indicate that the prepaid gas has been consumed, and the action of the meter has stopped.

Each reciprocation of the spring-piston C by the action of inserting the coin (which drops from the slot in the barrel into a money-box Z below) is made to reciprocate a rod G, by pulling it against the action of a spring at the last part of its motion in the inward direction; the lower end of the piston-head acting on the end of the rod. The other end of the rod is connected to the upper end of a lever and a spring pawl-lever, so as to turn, one tooth at a time, a spur or ratchet wheel, fixed on a hollow spindle, mounted loosely on the spindle, and which wheel would be fitted with a spring ratchet-pawl, to prevent it turning backwards. The spindle of this wheel projects out through a divided dial-plate fixed on the side of the box into which the coins were dropped, and which dial would be divided into (say) 100 divisions, corresponding to the number of teeth in the wheel; and the pointer on the axis would thus indicate the number of coins that had been inserted into the slot of the meter, and show, through a glass in the case, the number of coins which the person collecting the money should find in the box on unlocking it.

Lighting and Extinguishing Attachments for Gas and other Lamps.—Müller, H. L., and Adkins, W., of Birmingham. No. 6684; March 30, 1893.

This invention of "means for automatically turning-on, automatically electrically lighting, and automatically turning off gas and lamps and lights, and also in means for automatically switching on and off the current in lighting electrically," is an improvement upon patent No. 5417 of 1891.

In a gas-lamp attachment, the means employed consist essentially of chronometric mechanism, operating and connected with an adjustable dial-wheel; a time-wheel, and turning-on and shutting-off hands carried by the first-named wheel; and an escape-wheel, turning on the same common axis as the time-wheel, which axis is driven by a pinion that takes its motion from the chronometric mechanism enclosed within a drum casing. The escape-wheel is controlled by an escapement; while the escape-wheel itself is driven by gearing automatically operated by a supplementary spring. Working in conjunction with the escape-wheel is a long arm, pivotedly connected at its lower end; while the upper end has a stud working within a bifurcated crank, made fast to one end of the plug of the cock. The electrical connection is to a dry or other battery with the sparking-tips which intersect the ignition-point of the burner.

In carrying out the invention in connection with a gas-lamp attachment, the summit of the gas supply-pipe is fitted below the burner with a transversely-working cock, with one, or the larger, end of the plug fitted with a crank-arm, forked or bifurcated at its end, with which a pin or stud carried at the upper end of a long arm or lever engages. By its angular movement, the gas is turned on, electrical contact made, and the gas turned off, at periods predetermined by the setting of the hands relative to the time-wheel or the dial-wheel, normally coupled together by a pin, carried by one of the hands engaging in common with the teeth on the periphery of the dial-wheel, and with the teeth on the periphery of the time-wheel. The latter is made fast to, or turns with, a common axis driven from the chronometric mechanism; while the dial-wheel, which is adjustable, turns free upon the outer end of the common axis, when the coupling pin of one of the hands which traverses the face of the dial is withdrawn or pulled outwardly. These last-named wheels have their faces in juxtaposition; and the hands for turning on and off the gas are provided with inclined ends, so as to turn freely and independently upon the end of the common axis, while their set positions are arranged by their inwardly-directed pins respectively engaging with the teeth either of both wheels, or with the teeth of the dial-wheel.

Projecting from the outer sides of the ends of the hands, are studs or knobs, for pulling the hands upwards for readjustment; while the inclined ends of the hands come within the path of a pin or stud carried upon one of the extreme ends of an escapement or verge, pivoted about its middle, so as to rock alike unto a double-armed lever, and with its other end also fitted with an outstanding stud, which controls an escape-wheel, mounted loosely upon the common axis, and whose periphery is provided with twelve square-shaped teeth, separated from each other by intervening distances much greater than the breadth of the teeth themselves. These outstanding pins or studs of the escapement form, as it were, the pallets of the same; so that, when a hand comes in contact with the lower stud, the one end of the escapement is taken from out of the path of a tooth of the escape-wheel, while the pin at the other end is taken within the path of a tooth succeeding it. The result is that the pushing back of the escapement rocks the same, and releases the escape-wheel to the extent of one tooth, or to the extent of one-twelfth of a rotation.

The rotation of the escape-wheel, which has a star-shaped channel-cam formed within its inner face, is performed by an auxiliary spring, enclosed within a box casing, having a turning axis through its middle. The axis is fitted with a ratchet-wheel, with which a pawl, carried by a driving toothed wheel, engages. This wheel intergears with an intermediate and idle toothed wheel, which drives a larger toothed wheel, mounted upon (and made fast to) a neck or bush carried at the middle of the escape-wheel. Thus, as the winder axis of the auxiliary spring is wound up, the intermediate gear remains under the constant force of the spring; so that, immediately the escapement is rocked, the escape-wheel runs down to the extent of a tooth or other quantity.

The face of the dial-wheel is marked off into 24 divisions (corresponding to 24 hours), sub-divided up into half hours and quarters. In this way, assuming that a gas-lamp was to be lighted at six in the evening and extinguished at six in the morning, the hands cross the face of the dial-wheel in the direction of its diameter. The operating or actuating arm, which is jointed near its lower end, has a stud at its extreme end, which takes within the channel of the star-shaped channel-cam made within the face of the escape-wheel.

Located within a barrel, in the rear of the time and adjacent wheels, is a chronometric mechanism, consisting of an ordinary clockwork, carried by an attachable end cover or cap, fitted with outside winding-up mechanism. Assuming that this chronometric mechanism has been wound up, and also the auxiliary spring of the escape-wheel, also the hands adjusted to their positive position relative to the dial-wheel (say, to turn on and light at six in the evening, and to extinguish at six, after the lapse of twelve hours), the distance between the hands will be equivalent to twelve hours—that is to say, the hand for turning off will follow the hand for turning on, and impinge upon the stud of the escapement twelve hours from the time that the turning-on hand impinges upon it. Also, assuming that the time mechanism rotates chronometrically, the time-wheel, dial, and hand through the common axis, the turning-on hand, by its rotation at a predetermined period, impinges upon the stud of the escapement, presses back the escapement clear of the escape-wheel; and through the medium of its barrel spring, it then rotates through a determined space, and is caught by the second stud of the escape-wheel. The channel of the channel-cam operates the stud at the inner end of the operating-lever; and, through it, the bifurcated or slotted crank is turned. The cock is then opened; and gas is allowed to flow therethrough. But as the opening is only performed on the initial movement of the stud within the star-shaped channel, the further movement of the stud will further operate the actuating arm, close the electrical contact, and complete the electrical circuit. Hence the sparks pass between the extremities of the sparking-tips; and the automatic lighting of the gas is thereby accomplished. Assuming that twelve hours have elapsed, the cutting-off hand impinges upon the pin or stud of the escapement; and hence the liberation of a further tooth of the escape-wheel, and the passing thereby of a further portion of the channel-cam over the stud at the inner end of the operating-lever. This rocks the lever, and takes the cranked arm back again to its former position, so as to cut off the gas. The stud, when opening the cock, lies at the lowest portions of the channels of the cam, upon one side of the point of a star. When at the tip of the point, electrical contact is made; and when the stud is at the opposite lower point again, the cutting off is effected. This goes on continuously all round the star channel.

Variable-Speed and Reversing Mechanism for Gas-Engines.—Burt, P., of Glasgow. No. 7466; April 12, 1893.

This invention has for its object to provide, in connection with a gas-motor, mechanism by means of which the motion transmitted from the motor may be changed in speed or in direction, so as to allow for its use in driving railway, tramway, or common-road locomotives or carriages.

According to one modification, the motor is arranged to drive a

crank-shaft or first-motion shaft, which is horizontal; and, in the case of a tramway car or locomotive, it is disposed longitudinally thereon. The shaft is between two discs or transverse shafts; and it is made with two bevelled annular surfaces, at different distances from the centre, designed to be acted on frictionally by conical driving-pulleys on the crank-shaft—there being four of such pulleys, two on each side of the centres of the discs. By means of hand-wheels and gearing, any one of the four driving-pulleys can be put into contact with its proper disc-surface, whereupon the discs will be driven in opposite directions at a quick or slow speed, so as to propel the car in one direction or the opposite. In the case of a tramway locomotive or car, motion would be transmitted to the wheel-axles from the shafts of the discs, by means of sprocket wheels and pitch-chains; the motion of one disc-shaft being communicated through a pair of pinions, so as to act in the same direction as that of the other disc-shaft.

Controlling the Flow of Gas passing from Gasholders to the Street-Mains, and also for Obviating the Putting Out of Action of One Gasholder before Another is Placed in Action.—Armitage, F., of Market Harborough. No. 7764; April 17, 1893.

This invention relates to apparatus by the use of which the possibility of accident arising through neglect or forgetfulness in the turning on and off of "day" and "night" gasholders, is reduced to a minimum. It consists in an arrangement of valves, adapted to control the supply-pipes from the separate gasholders and the delivery-pipe in such a manner that the operation of closing the valve of one supply-pipe will simultaneously open the valve of the other supply-pipe, and place it in communication with the delivery-pipe, so that in no case can the delivery of gas be wholly cut off.

Fig 1.

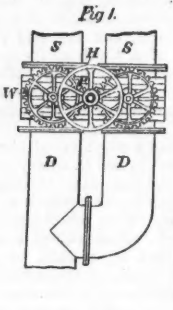


Fig 2

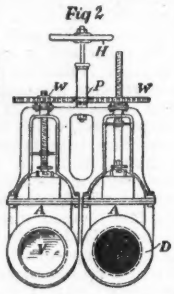


Fig 3.

Figs. 1, 2, and 3 illustrate the invention as applied to two separate ordinary vertically moving valves controlling two supply-pipes. Fig. 4 is an arrangement of one rotary centre-valve controlling two pipes.

A is the valve-box, made in two parts, with flanges for the attachment of the supply-pipes S from two gasholders, and for the delivery-pipes D therefrom to the district to be supplied. These delivery-pipes are connected as shown in fig. 1, so that gas passing through either flows into the one delivery-main D. V are two ordinary vertically moving valves; and each is worked simultaneously in opposite directions from one centre, in the following manner: To each valve is fixed a vertical reversely-screwed spindle, supported by brackets fixed to the casing A; and upon each spindle is screwed a gear-wheel W, which is prevented from rising upon the screw in the usual way. The two wheels W are operated by a pinion P gearing with both, and worked by a central spindle, fixed in a suitable column-bearing, and provided with a hand-wheel H. It will be obvious that, by operating the wheel H in either direction, the two valves V will be equally moved in opposite directions—thus simultaneously closing one and opening the other supply-pipe, but never cutting off the gas from the delivery-pipe D.

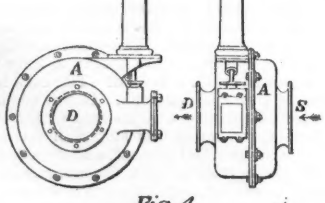
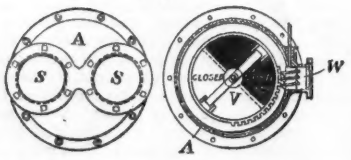


Fig 4.



Referring to fig. 4, the casing A forms the junction-box, and has flanges to receive the two supply-pipes S and one delivery-pipe D. V is one central rotary valve, adapted to control the supply and delivery pipes as above described. It is pressed against its seating by a spring, and has a toothed periphery, with which gears a worm W, the spindle of which is extended through an ordinary stuffing-box and up the column-bearing, and terminates in a hand-wheel H. I is an indicator for showing the working positions of the valve. By operating the worm W, the valve may be turned as desired, either to make communication between both supply-pipes and the delivery-pipe, or to entirely close either supply-pipe—leaving the other in full communication with the delivery-pipe.

APPLICATIONS FOR LETTERS PATENT.

7523.—Moller, K., "Filter for air, gas, and steam." April 16.

7552.—Gimblett, S. R. H., and Adams, W. H., "Gas-making machinery." April 16.

7575.—Watson, S., and Young, J., "Cross-bars and fittings for securing retort-lids." April 17.

7626.—Bagley, W., "Apparatus for feeding coal to gas-producers." April 17.

7630.—Butter, F. H., "Operating and controlling the valves of steam, gas, or oil engines." April 17.

7638.—Imray, O., "Incandescent gas-lamps for railway carriages and other localities having limited head-room." A communication from J. Pintsch. April 17.

7716.—Vallet, C., "Gas-engines." April 18.

7862.—Newton, H. E., "Purification of anthracene." A communication from the Farbenfabriken Vormals Friedrich Bayer and Co. April 20.

7899.—Thorp, T., Marsh, T. G., and Haynes, J., "Prepayment mechanism." April 21.

7934.—While, J. M., and Timmins, J., "Combined gas-producer and steam-generator." April 21.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Largest Metal Gasholder Tank.

Sir,—We notice in the last issue of the Journal an article headed "The Competing Gas Supply for New York," in which it is mentioned, in reference to the large three-lift gasholder at the works of the East River Gas Company, which affords storeage for 5 million cubic feet, that "the tank is believed to be the largest metal tank in the world," and is made of steel. Seeing that the outside lift of the gasholder is only 187 feet in diameter and 49 ft. 2 in. deep, we would claim to have just completed a larger steel tank for the Leeds Corporation; its diameter being 242 feet, and its depth being 41 feet. The holder which works in it is a three-lift one. The inner lift is 235 ft. 6 in. in diameter and 40 ft. 6 in. deep; the middle lift, 237 ft. 9 in. in diameter and 40 ft. 3 in. deep; and the outer lift, 240 ft. in diameter and 40 feet deep. If the New York tank was the largest in the world when it was erected, ours must now take that position; and we can not only claim to be the makers of the largest gasholder in the world, but also of the "largest metal tank in the world."

Hunslet, Leeds, April 26, 1894. Clayton, Son, and Co., Limited.

Gas as a Fuel.

Sir,—Dr. Pullar's complaint, in his letter in your last issue, does not deal with the matter in a sufficiently comprehensive way. Naturally, he would be better pleased if the gas companies would let out his apparatus on hire; but the fact remains that fancy glass-work is not suited for the rough handling which hired apparatus gets in practice, including storing in thousands when out of season. The first necessity for hiring is that the apparatus must be able to stand a considerable amount of knocking about and rough usage, and that it can be easily and cheaply repaired without returning to the maker. I think I am well within the mark in saying that the trade in gas-heating appliances, through *bonâ fide* dealers, outside the gas companies, is larger now than it ever has been; and that this increase is almost entirely due to the action of the gas companies in hiring out apparatus, and so popularizing the general use of gas as a fuel. That the trade outside the gas companies is large and important, may be judged from the fact that, out of a total of 430 ordinary patterns of gas-heating appliances made by us, not more than 86 of these are hired out by any gas company; four-fifths of the whole of our patterns being made for ordinary sale by the trade.

Thos. Fletcher, Managing Director,
Messrs. Fletcher, Russell, and Co., Limited.

Warrington, April 26, 1894.

The Yeadon Revolving Retort.

Sir,—By substituting the word *suggested* for "established," *treating* for "heating," and *Ripon* for "Leeds," in the 5th, 11th, and 49th lines of your report (*ante*, p. 703) of what I said at the Informal Meeting of Scottish Gas Managers, a correct idea may be formed of what I really did say. In other respects your report is substantially correct.

D. M. Nelson.

April 28, 1894.

[The second inaccuracy pointed out by our correspondent was obviously a misprint. With regard to the others, his letter arrived too late to allow of reference to our reporter's notes; but the distinct impression of a gentleman who was present at the meeting is that the words used by Mr. Nelson were as given in our report.—Ed. J.G.L.]

The Winding-up of the Buckfastleigh Gas Company, Limited.—The creditors and shareholders of the Buckfastleigh Gas Company, Limited, met last Wednesday week, under the liquidation proceedings. No resolutions were passed; and the estate will be wound-up by the Official Receiver, acting as liquidator. The Company, it may be remembered, was formed last May, with a capital of £5000, to acquire existing gas-works at Buckfastleigh, Devon; but the subscriptions were insufficient for providing working capital.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Bills:—

Bill brought from the Commons and read the first time: South Hants Water Bill.

Bills referred to a Select Committee, consisting of Lord Poltimore (Chairman), Earl Bathurst, Lord Seaton, Lord Wimborne, and Lord Crawshaw; to meet on Monday, April 30: Abertillery Local Board (Gas and Water) Bill, Kendal Corporation Gas and Water Bill, and Millom Local Board Bill.

Bills reported: Alloa Water Bill, Bacup Corporation Water Bill, Falkirk Corporation Gas Bill.

Bills read the third time and passed: Alloa Water Bill, Swinton Local Board Bill.

Bill withdrawn: Falkirk and District Gas Bill.

Opposition withdrawn to the Consett Water Bill and the Edinburgh and Leith Corporations Gas Bill.

HOUSE OF COMMONS.

The following progress has been made with Bills:—

Standing Orders complied with: Colne Valley and Central Middlesex Water Companies' Bill, Wemyss, &c., Water Provisional Order Bill.

Bill read a second time and committed: Wemyss, &c., Water Provisional Order Bill.

Bills reported: Carshalton and Croydon Gas Bill, Chesterfield Water and Gas Bill (preamble not proved), Dundee Corporation Bill.

Opposition withdrawn: Lambeth Vestry, against the Southwark and Vauxhall Water Bill.

HOUSE OF COMMONS COMMITTEE.

(*Before Sir* JOSEPH PEASE, *Chairman*; *Mr.* BRUNNER, *Mr.* BAIRD, *and Mr.* RANKIN.)

Monday, April 23.

EAST LONDON WATER BILL.

The East London Water Bill, which proposes to raise £500,000 of additional capital for the construction of further works, came before the above Committee to-day.

Mr. PEMBER, Q.C., Mr. C. A. CRIPPS, Q.C., and the Hon. A. LYTTELTON appeared as Counsel for the promoters. The opponents were represented as follows: The London County Council, by Mr. COHEN, Q.C., and Mr. FREEMAN; the Corporation of London, by Mr. LITTLER, Q.C., Mr. RIGG, and Mr. HENRIQUES; the Corporation of West Ham, by Mr. LITTLER, Q.C., and Mr. BAGGALLAY; and the Essex County Council, by Mr. H. C. RICHARDS. The Great Eastern Railway Company also presented a petition; but there was no appearance of Counsel.

Mr. PEMBER, in opening the case for the promoters, said that the question of the London Water Supply had occupied public attention for some years; there being two main points in respect of which it had been aroused. The first was as to whether the Companies should continue to be the purveyors of water, or whether their undertaking should be purchased either by the London County Council alone, or in connection with the Corporation and other authorities who were largely interested in the question, inasmuch as the Thames and Lea and the gravel beds and chalk formed not only the supply for London itself but also for outside districts. The second question was as to whether the supply for London should, for a certain number of years at all events, be taken still from the Thames and the Lea. The first point would only come before the Committee, if at all, in the most incidental way; but the other would have to be substantively considered. The object of the present Bill, apart from its surroundings, was that the East London Company should be allowed to raise £500,000, to be spent on the enlargement of their existing storeage reservoirs, the enlargement and improvement of their filter-beds, and the extension of mains and service-pipes. In the title of the Bill, the draftsman had inserted an extremely pregnant paragraph—"To authorize the East London Water-Works Company to execute further works and to raise further money, in order to enable them to fulfil their statutory obligations relating to the supply of water or otherwise, and to meet the increased demand for water within their district." That gave a certain seriousness to the application which he did not think he could accentuate too much. If the Bill were refused, he did not hesitate to say, quite apart from the Water Company as a commercial undertaking, a very great blow indeed would be administered to the wellbeing of that part of London. The learned Counsel went on to explain the capital powers which had been granted to the Company in past years; and he said that the works proposed were the construction of two storeage reservoirs and an extension of the Race Course reservoir, with certain conduits and pipes. The Race Course reservoir was to be raised 9 feet; and as it was originally constructed with a view to being so raised, there was no engineering difficulty about it. The present storeage capacity was 740 million gallons, which would give a very short number of days' supply—about fifteen; and the time had more than arrived when that storeage must be increased. The amount by which it was proposed to increase it was 510 million gallons. By section 18 of the Bill, the capital proposed to be raised was allocated to the various works thus: £145,000 to the reservoir extension; £45,000 for the filter-beds; £80,000 for additional engine power and machinery; £140,000 for the extension of mains and service-pipes during the next seven years; and £40,000 for high-service reservoirs, for the purpose of improving the constant supply. That made £450,000 out of the £500,000; leaving only £50,000 for working capital and contingencies. The learned Counsel proceeded to point out that the main increase in the demand came from the district in Essex outside the London County Council's area; and that, in consequence of this increase and of the shortness of supply given by the existing works, it had been necessary in 1887 and 1891 to resort to an intermittent supply; so that if the Company were to do their duty to the consumers of London, increased storeage and filtration works were absolutely necessary. The Royal Commission on the London Water Supply had distinctly reported that, for the next 40 years, the Thames and Lea, and the gravel beds and chalk, with the springs that supplied the New River, would be equal for every calculable increase of the population of London; and, further, they said that not only would it be ample in quantity, but excellent in quality. In regard to the Lea Valley, they specially discussed the plan of the East London Company's Engineer (Mr. Bryan), of which the works now proposed were the first instalment. Having read the report of the Commission upon Mr. Bryan's scheme, Mr. Pember went on to state that the Commission reported just as strongly on the efficiency of quality as the quantity. After having investigated the subject with extraordinary minuteness, and receiving scientific evidence with great elaboration, they made certain recommendations as to the prevention of pollution, and as to the treatment of the water after its abstraction from the river. With regard to filtration, they said: "We have further to consider what steps should be taken to ensure the proper treatment of the water that is taken from these rivers for the supply of London. For the water that flows down to the intakes must be subjected to certain important processes, before it is brought into a suitable condition for delivery and consumption. These processes consist of subsidence and filtration; and the quality of the water when delivered depends largely upon the thoroughness with which they are carried out. It does not come within the terms of our reference to lay down what should be the exact regulations as regards filtration—that is to say, what should be the proportionate area of the filtering-beds, the depth of sand, the frequency of renewal, or the rate at which the water should be allowed to percolate; nor as regards the subsidence-tanks, how many days' storeage should be deemed sufficient so as to obviate the necessity of taking in turbid storm-water, and to allow of due settlement; but we cannot shut our eyes to the fact that the provision for these purposes differs enormously in the different Companies, and in some of them is to our mind quite inadequate." Could anything be stronger than the Commissioners' conclusion as to quantity and quality: "We are strongly of opinion that the water as supplied to the consumer in London is of a very high standard of excellence and of purity, and that it is suitable in quality for all household purposes. We are well aware that a certain prejudice exists against the use of drinking water derived from the Thames and the Lea, because these rivers are liable to pollution, however perfect the subsequent purification, either by natural or artificial means, may be; but, having regard to the experience of London during the last 30 years, and to the evidence given to us on the subject, we do not believe that any danger exists of the spread of disease by the use of this water, provided that there is adequate storeage, and that the water is efficiently filtered before delivery to the consumers. With respect to the quantity of water which can be obtained within the watersheds of the Thames and the Lea, we are of opinion that, if the proposals we have recommended are adopted, a sufficient supply to meet the wants of the Metropolis for a long time to come may be found, without any prejudice to the claims, or material injury to the interests, of any districts outside the area of Greater London." That was the conclusion of the Commission, after weighing carefully all that could be said as to quantity and quality, and also as to the purification of the Thames and Lea. The main opposition to the Bill was from the London County Council, who alleged in their petition that the report of the Commission confirmed in a great measure the opinions which the County Council previously entertained. The story of Balak and Balaam, if he might refer to it without irreverence, was not "in it" with the contradiction which they got from the Royal Commission. In their petition, they said that further works and expenditure were absolutely necessary, in order to provide storeage and filtration. That was the preamble of the Bill. It was a statement that the Bill was necessary, and urgently necessary; and yet one of the reasons why the County Council tried to upset the Bill on the second reading in the House of Commons was that there was no immediate hurry. They never stopped to think how one argument came in the way of another. All London might perish of typhoid fever, if only they could belittle the Companies, and undermine their every effort, so as to enable them to buy on their own terms. It was for Essex that this water was wanted; and he presumed that Essex had got something to say whether the Company should be thrown back, in order to play the game of the London County Council. The County Council further stated that they had given instructions that other sources available should be investigated and reported upon. But, he asked, what was the advantage of further inquiries; what was the use of a gentleman like Lord Balfour and his colleagues sitting for a year, and wasting their energies upon a report of that character, if the County Council were going to take that position in the matter. They had been talking about inquiries for the last four years. On no data at all they had expressed their desire to have the supply of London in their own hands, and to buy up the Companies, if they could, for an "old song." The Royal Commission were of opinion that the sources of supply from the Thames and Lea were abundant for the needs of London for the next 40 years; and therefore they should be utilized before thinking of going on wild-goose chases to South Wales or the Lakes of Cumberland. He challenged them to find in any report to Parliament a recommendation of the London County Council as the proper water authority for London. A water authority which, before they did anything, should buy the water undertakings, had been recommended by Parliament; but it was not the London County Council. In fact, the interests of Greater London were far too wide to allow of handing the Companies over to the London County Council. In conclusion, he said that the London County Council asked to be allowed to purchase this undertaking; but that was just the thing which Sir Matthew White Ridley's Com-

mittee, and the Committee presided over by Sir Joseph Pease also, distinctly said they should not do—namely, buy up the Companies piecemeal, in order to vex the others. If the purchase was made, it should be made in its entirety; and it should not be possible for the County Council to buy up one Company apart from the rest.

The following evidence was then taken:—

Mr. *W. B. Bryan*, the Engineer to the Company, examined by Mr. CRIPPS, said that at Walthamstow they had eight storeage reservoirs, with a water area of 220 acres, and a capacity of 740 million gallons. The two new reservoirs would be of a capacity of 360 million gallons. The raising of the banks of the Race Course reservoir would give an additional capacity of 150 million gallons, making the total storeage 510 million gallons. In the part of the Company's district which was within the area of the London County Council, there had not of late years been an increase in the supply; but, on the contrary, during 1891 and 1892 there was a decrease of about 270 houses taking the Company's water, and a further decrease of a like number of houses in 1893. In fact, the ground within the County Council's area had become entirely built over. In the outside district in Essex, the demand had increased by about 2700 houses per annum.

Mr. CRIPPS, in reply to the Chairman, said that he was drawing no distinction between houses and manufactories, and that the figures quoted related to supplies.

Witness, in further examination, said that the additional works which were proposed were in order to meet the demand outside the County Council area. Owing to the increased demand in past years, they had had to turn off the water at times eight or ten hours a night, and to make the supply intermittent; but if they had had a sufficient supply, they would not have resorted to such a measure. In 1893 they shut off the water at night from Sept. 1 to Oct. 13; and in 1887, from July 27 to Nov. 4. Taking 14 years from 1881, the average flow over Fieldes Weir was 186 million gallons a day.

The CHAIRMAN said that the Committee looked upon the report of the Royal Commission as a very authoritative document; and they did not require evidence to be laid before them which had been taken before the Commission. They regarded the report of the Commission as a text-book on the water supply.

Mr. FREEMAN remarked that he had not the slightest intention of impugning any of the conclusions come to by the Commission.

Mr. CRIPPS said that, taking this to be the starting-point, the question arose, as the district outside the London County Council wanted an additional supply, what view did Mr. Freeman take on that?

Mr. FREEMAN declined to disclose his case until the proper time arrived.

The CHAIRMAN said that in the report they had evidence up to a recent date; but if anything had occurred since then, showing that anything had gone wrong as to the quality or quantity of water, they would hear evidence of it.

Witness said that the conditions upon which he gave evidence to the Commission had not altered at all since then.

Mr. RANKIN: Not even as regards rainfall?

Witness: No; nothing has tended to alter the facts laid by me before the Commission.

In further examination, witness stated that the works proposed were the first portion of those laid by him before the Royal Commission; and the capital was all allocated to particular purposes. The amount allotted to mains was proposed to cover what it was anticipated would be required within the next seven years. The £145,000 for reservoirs Nos. 1 and 2, and the alteration of the Race Course reservoir, was an exact estimate; as was also the £45,000 for filter-beds, and the £80,000 for additional engine power.

The CHAIRMAN asked how the £140,000 for seven years' extension of mains was arrived at.

Witness said he took £20,000 per annum for seven years for extending the mains and services in the new district, which was increasing at the rate of 16,000 people every year. New estates were opened out, requiring new mains. The £40,000 for high-service reservoirs was intended for the outside district.

Mr. BRUNNER: Where are they?

Witness said they had one reservoir at High Beech holding 2½ million, and another at Woodford holding 3 million gallons. That was the whole of the storeage which they had for the Essex district; and it was now proposed to construct other reservoirs at Woodford, on the borders of Walthamstow. For the London district, they had a high-service reservoir at Finsbury Park; but for the outside area, they had only five to six hours' storeage, which was much too small. The Company had exhausted all their existing capital powers; so that for the further works new capital was absolutely required.

Cross-examined by Mr. LITTLER, for the City Corporation and the West Ham Corporation: The amount of capital proposed to be raised by the Bill amounted to one-fifth more than the present capital. He estimated that it would be seven years before they completed the works proposed; but how long they would carry the Company forward depended on the rate of increase of population. The total population supplied by the Company in Essex was 432,168; and the increase between 1891 and 1894 was practically 48,000. He estimated roughly that the new works would carry the Company forward for ten years. They never guaranteed a constant supply of water east of the River Lea; but, as a matter of fact, they did give it, except in times of drought, when the storeage was nearly depleted.

Mr. LITTLER said that his clients did not want to starve the Company. All they were anxious to do was to prevent them getting more capital than was necessary.

In cross-examination by Mr. FREEMAN, for the London County Council, witness said they only took 42 million gallons a day from the Lea, out of the 66 millions which they were entitled to take.

Mr. FREEMAN: Do you actually represent that at the present time you have not sufficient water to carry you on for several years?

Witness: Yes, I do. Our storeage is insufficient for us to get 30 million gallons a day, which has necessitated the intermittent supply when the storeage is depleted.

Mr. FREEMAN: Besides your sources of supply, you have power to purchase, under the inter-sale clause, water from another Company?—I am not aware of that; and even if there were such powers, physically it would not avail the East London Company, for this reason: We have at our Thames supply works a main 36 inches in diameter, which terminates at the Finsbury Park service reservoir. We have power to take 10 million gallons a day from the Thames; and as that main will not require any more, any interchange of powers would be useless.

Cross-examination continued: It was quite true that at several points they had physical connection with the Grand Junction Company; but, as he had said, the main would not carry more water. As to the purity of the water, the stringent provisions suggested by the Royal Commission had, to his certain knowledge, been carried out for the last 12 years. With regard to the correspondence that had passed with the County Council on the purchase question, it did not come within his department. He thought it would be unreasonable to delay the Bill any longer, until the County Council had made up their mind. They might pass the preamble; and then, if a new scheme were brought in by the County Council, or terms were negotiated and come to between the parties, the works need not be carried out. Last year, on the same plea, the County Council defeated the Company's Bill on the second reading; and the same thing might go on from year to year, to the great detriment of the increasing population of Essex.

In re-examination by Mr. CRIPPS, witness said that the water taken by the proposed new works would be of the same high quality as that which was favourably reported on by the Royal Commission. At dry times, the Company were taking all they were entitled to from the Thames; but in the case of the Lea, the Conservancy were entitled to what they required for the navigation in the lower reaches of the river, and what was left the Company could have. They were now taking to their full capacity from both rivers; and the requirements of the district would not admit of any further postponement.

Replying to the CHAIRMAN, witness stated that he did not think the proposed storeage would be excessive, though it would be more than was possessed by the other London Companies; but the Thames had such a huge flow as compared with the Lea, that storeage reservoirs had not been considered so necessary at the present time on the Thames as in the Lea Valley. As to the money to be spent on the mains and new services, during the last three years the average amount which they had expended had been £16,000 per annum.

Sir *F. Bramwell*, examined by Mr. CRIPPS, said that he had had to do with seven of the Metropolitan Water Companies, and especially with the East London Company. It was his opinion that some provision should be immediately made to meet the growing demand; and, as a matter of fact, he believed that the present provision was inadequate to meet in a proper manner the great demand which existed during times of drought. If the Company were to have the means of taking water from the Lea in its present condition, and taking it without prejudice to the buyer, they must leave the first of the flood and when the river was low, or take only a small quantity, which meant that they required ample storeage in order to avoid taking the water when it was not acceptable. As to the suggestion of the postponement of the scheme by the London County Council, he had heard this more than once. When Liverpool was going for the Vyrnwy supply 14 years ago, Sir John Lubbock desired that the matter should be postponed till the report of some Commission. It was the same with the Birmingham scheme; but, in giving evidence on the latter, he told the Committee what had happened in the Liverpool case—that the works would soon be opened, and that the Commission had not reported.

Cross-examined by Mr. FREEMAN as to whether it would not be desirable to await the action of a proper authority, witness said he did not understand what the learned Counsel meant by "proper authority." If it was the County Council, he should not place the slightest reliance upon them. He meant that though he would rely upon their introducing a Bill, he should not rely upon their obtaining the Act. He considered that the proposed works would improve the property to the full extent of the money spent upon them.

Mr. FREEMAN: What do you consider the effect of raising the Race Course reservoir, and not constructing the new reservoirs, would be?

Witness: It would give an additional storeage, but not sufficient even for the present requirements.

Mr. *A. Johnstone*, Chairman of the Essex County Council, gave evidence as to the strong desire of the people of Essex that the Company should have the powers asked for. The area was absolutely under the jurisdiction of the Essex County Council; and he had yet to learn what the London County Council had to do with it. Undoubtedly they wanted to get their foot into it, as was shown by their opposing the Bill in other ways.

Mr. *A. Savill*, a member of the Essex County Council, also gave evidence as to the increasing population in the Essex district, and the need for further works for water supply.

Cross-examined as to whether a postponement for another year would do any harm, witness replied that if it was postponed it should be made a certainty that the works would be proceeded with at the end of that time.

Mr. *Musgrave*, Clerk to the Leyton Local Board, and a member of the Essex County Council, said that there had been complaints as to the supply of the district, which was largely composed of a working-class population. If the works proposed in the Bill would enable the Company to give a constant supply, it would be regarded with approval, for its necessities were as great as those of any other district of the Metropolis. He did not want to wait for that constant supply till a Trust or Water Board was established.

Mr. *C. Hawksley* said that, in conjunction with his father (the late Mr. Thomas Hawksley), he had advised the London Water Companies for many years. He had examined the sites of the proposed new reservoirs, and that of the Race Course reservoir; and he considered them suitable and adequate. It was usual for the Water Companies to make provision for several years ahead; and in the case of Birmingham provision was made for 40 years. In the present instance, though the money would be expended in seven years, it would carry the undertaking forward a somewhat longer period than that. The population must not be kept waiting for water simply because some other scheme for bringing it from a distance might be proposed; for even if there were such a scheme, it would require many years to carry out. If the Companies were to fulfil their statutory obligations

and afford a supply to the inhabitants, they must follow the growth of the population; and, as the population grew, they must construct new and additional works.

Cross-examined by Mr. FREEMAN, witness said that he regarded seven years as the outside limit within which the new works would be constructed; but they would be available from time to time as they were completed.

Mr. FREEMAN: Supposing it could be definitely shown that next year a scheme would be submitted to Parliament for dealing with the whole question, do you not think it fair that it should be left unfettered by these fresh powers being given to private Companies?

Witness said he did not think so. Should such a scheme be proposed next year, Parliament would then be able to say that so much of the works authorized last year as were considered not to be required should not be carried out.

In re-examination by Mr. PEMBER, witness stated that there was no such scheme set forth in the petition of the London County Council. His opinion was that the County Council were simply opposing in order to hamper the Company in carrying out its duties, with a view to purchasing its property at a cheaper rate.

Examined by the CHAIRMAN as to the views which his late father entertained with regard to the general water supply of London, witness said he was of opinion that, if the existing sources were insufficient, they would have to go a long way off for another supply, and that the execution of the works would occupy 15 to 20 years.

Mr. PEMBER having intimated that he had other witnesses to call,

The CHAIRMAN said there was no occasion for "piling up the agony" on that part of the case. He understood that the position of the London County Council was that they wished to do this kind of work themselves; and that they were prepared to be the Water Authority at a very early date.

Mr. FREEMAN said that was so. He should not dispute the fact that the Essex people wanted a proper supply of water; but his point was very much what the Chairman had indicated.

Mr. PEMBER remarked that the County Council had no jurisdiction to supply water to Essex, any more than they had to supply Cumberland.

The CHAIRMAN said they did not require more evidence as to the need and capability of supplying water by the Company.

Mr. PEMBER said that, under those circumstances, he would close the case for the promoters.

Mr. RICHARDS, for the Essex County Council, said he was very anxious to see someone who could give information with regard to raising the capital, and dealing with the sinking fund.

Mr. PEMBER promised that, if it were necessary to call one of the Company's officers for that purpose, it should be done.

Tuesday, April 24.

Mr. FREEMAN this morning addressed the Committee, on behalf of the London County Council, in opposition to the Bill; calling attention to the report of Sir William Harcourt's Committee in 1880, in favour of the water supply being placed in the hands of a public authority, at which time there was nobody directly representing the water consumers of the Metropolis and the ratepayers in the same way that the London County Council now did. Since that body came into existence, they had been steadily directing their attention to the question; and they had now in hand a scheme, having placed themselves in such a position, as to all the sources of information, that they were prepared to say that, within a very limited period indeed, they would introduce a proposal to Parliament to finally set at rest that vexed and troublesome question. Negotiations had been authorized with the various Water Companies as to purchase on fair and reasonable terms. The negotiations with the East London Company, however, had not been successful; and therefore the Council were obliged to appear against the Bill, in order to safeguard the interests entrusted to them. This Bill, he contended, would enormously increase the capital power and capital value of the Company; and the powers were not required within any immediate future time, having regard to the undertaking of the Council that within one year they would deal authoritatively before Parliament with the entire question of the water supply. The suggestion that the County Council had nothing to do with the present proposals, because they were required for the Essex part of the district, was a fallacy, for it was obvious that, when it came to a question of purchase, they would have to buy the undertaking as a whole. If the argument were to be granted, it would apply to every Water Company in London which had limits of supply outside the County Council area. Dealing with the proposed expenditure on reservoirs, he said that when Mr. Bryan was before the Royal Commission, he put in a statement that the reservoirs were absolutely satisfactory, and that they never ran down once; and inasmuch as the new ones would take seven years to construct, he urged that one year's delay in spending that further money would do the Company no harm, and would not place them in any difficulty as regarded the consumers. As the expenditure on filter-beds depended upon the construction of reservoirs, the same remark would apply; so that it would be only reasonable that, in whatever proportion the Committee cut down the reservoir accommodation, it should in a similar proportion reduce the filter-beds. As to the £20,000 a year for extension of mains, he suggested that it should be restricted to one year, or at the outside two years, when the whole question would be decided by Parliament.

Mr. *A. Bassett Hopkins*, Chairman of the Water Committee of the London County Council, was then called in support of the Council's case, and related the proceedings which had taken place in the Committee and the Council in regard to the water question. The Council's view was that at the earliest possible period there should be, if not an abandonment, at any rate a diminution as far as possible of recourse to the river water for drinking purposes; and this would necessitate the opening up of some other supply. The Council was still pursuing its inquiries; and Mr. Binnie, their Engineer, was also investigating, and was about to report upon, other sources of water supply from Wales and elsewhere. The inquiries were now so complete that he thought the Council were actually in a position to be able to pledge themselves to introduce a scheme dealing with the whole of the matter. Under these circumstances, he was very desirous that no large works at extra cost should be sanctioned in respect of a Company whose undertaking they might shortly have to acquire—especially works which might be more or less inconsistent with what they might decide should be the ultimate system of water supply. He did not oppose anything that might be shown to be necessary for the East London Company in the immediate future.

Witness was cross-examined by Mr. PEMBER as to the terms on which the Council wished to buy the Companies. He said they were willing to purchase on reasonable and fair terms, as those words would be understood by an arbitrator, provided the rules of Court under which the arbitrator should estimate the value were determined by Parliament, and included the various burdens and responsibilities on the Companies.

Mr. PEMBER: You want his hands tied before you go in.

Witness remarked that they wanted the rules of Court laid down for him, certainly, or for it to be left entirely to the judgment of Parliament. Continuing, he said that the negotiations with the Companies did not commence until after the Bills were deposited for this session; the 5th of March being the day on which they were first communicated with. They found themselves menaced, as they thought, with the addition to the vested property of the Companies, and a very large sum of money in permanent works, which would augment the purchase, money on the transfer to the Council, and would be a dead weight, because after all they might have to be abandoned. The Council had not stated to any one of the Companies what price they were prepared to give. There was no specific information to give to the Committee, as to whether the Council proposed to go for its alternative or additional supply to Wales or Cumberland or to the Thames Valley.

In cross-examination by Mr. RICHARDS, witness said that, if the Council purchased the Company's undertaking, they proposed to leave the Essex people the option of taking the water from the London County Council, or to have a public water authority for themselves.

In re-examination, Mr. FREEMAN put in the following letter, which had been addressed by the Council to the various local authorities, as to suggested co-operation on the water question:—

Sir,—You are no doubt aware that the question of water supply has for some time past been engaging the consideration of the London County Council and of the Committee especially appointed to deal with the subject. The Council and Committee are anxious, as far as possible, to act in concert with, and to secure the co-operation of, the various County and Local Authorities surrounding London who are immediately interested in this question; and I am instructed, on behalf of the Water Committee, to communicate with you on the subject. It may be remembered that, when in 1891 Bills were pending in Parliament with reference to the future water supply of London and neighbourhood, I was desired to communicate with the representatives of the local water authorities interested, with a view to common action; and a conference was ultimately arranged, when the representatives of several authorities attended, and a discussion ensued, with satisfactory results. On that occasion a proposal was made in the following terms: In the event of the undertaking of any Metropolitan Water Company being purchased, any local authority outside the London county boundary within the area of supply of such Company shall have the option either (1) of purchasing on suitable terms so much of the works of distribution as is appropriated to the district of such local authority, with the right to a supply of water in bulk from the London County Council on terms to be arranged, or (2) of having water supplied direct by the London County Council. The proposal appeared at the time to command a general assent; and the Committee of the Council dealing with the matter think it desirable to intimate at the present time that they should recommend the Council to adhere to the policy therein set forth. I shall be glad if you will favour me with the views of your authority on the subject; and if you will also let me know whether, in your opinion, it would be desirable that a further conference should be arranged.

Mr. PEMBER then addressed the Committee in reply; urging that there ought to be no opposition to such a Bill, unless it was shown to be absolutely needless or outrageous. He pointed out the importance of keeping the supply of water to such a population as that of London ahead of the demand; and he said the Company were exceptionally moderate in looking forward only 10 or 15 years, during which even the County Council authorities acknowledged that water must continue to be taken from the Thames and the Lea.

The Committee then consulted in private; and on the re-admission of the parties,

The CHAIRMAN said: We are all of opinion that the preamble of this Bill is proved; and in clauses we do not propose to limit the amount of works proposed by the present Bill. But in giving that decision, we do not wish in any way that it should prejudice the question of the acquirement of the water supply of London and this district by a competent water authority, without giving any opinion at the present moment as to what that water authority should be. The question of clauses, of course, is still open before us, except with regard to the limitation of works.

The consideration of clauses was postponed until the other Water Bills (the West Middlesex and the Southwark and Vauxhall) referred to the same Committee had been dealt with.

Additional Capital for the Woking Water Company.—The shareholders of the Woking Water Company have empowered the Directors to create and issue £10,000 of additional capital. A portion of the money is required to pay for pumping machinery already ordered, and to carry out further extensions.

The Price of Gas North of the Thames.—A public meeting, convened by the Gas Consumers' Protection League, was held in the Shoreditch Town Hall last Tuesday, to protest against the difference of 8d. per 1000 cubic feet in the price of gas in the districts of The Gaslight and Coke Company north and south of the Thames. Mr. N. Moss moved a resolution embodying the protest of the meeting against the higher charge on the northern side; and it was seconded by the Rev. H. B. Kelly, and supported by Mr. J. Rowlands, M.P., and Mr. J. Stuart, M.P. The latter stated that he regarded the question before the meeting as a strong argument in favour of London having the control of its own lighting arrangements. Other speakers followed; and the resolution was carried.

MISCELLANEOUS NEWS.

ANTWERP WATER-WORKS COMPANY, LIMITED.

The Annual Ordinary General Meeting of this Company was held last Thursday, at the London Offices, No. 86, Cannon Street, E.C.—Mr. DAVID EVANS in the chair.

The SECRETARY (Mr. J. M. Hamilton) read the notice convening the meeting; and the report and accounts for the year ending Dec. 31 last were taken as read.

The CHAIRMAN, in moving their adoption, said the shareholders would notice that the income of the Company for the year from all sources amounted to £27,785, as compared with £26,249; and, after deducting working expenses, the cost of laying on services, and debenture interest, the net revenue was £13,685. To this amount was added the sum of £480 brought forward; making a total credit of £14,165. Against this had been charged £1770, the balance of the frost expenditure, which was incurred in 1891; and this would wipe off the whole of the amount that was in suspense. No such sum would be required for this year; and, even if they remained in the same position in other respects as last year, this would enable them to pay a dividend of 4 per cent., instead of 3½ per cent. There was left for distribution £11,710, out of which the Directors recommended a dividend at the rate of 3½ per cent., free of income-tax. There would then remain £1210, of which the Directors suggested £1000 should be transferred to the sinking fund. It was expected that the Hydro-Electric Company (from whom they were to receive a minimum income of £500 a year) would have been at work before this. But the Directors of that concern now stated they were certain to begin working by the time the Exhibition opened; so that they ought to have eight months' income from them this year. The Board hoped that next year they would be able to commence putting on one side about £3000 per annum for the amortization of the whole of the subscribed capital, which amounted to £332,000.

Mr. W. BLABER seconded the motion, which, after a short discussion, was carried.

The dividend recommended was then declared; and resolutions were also passed re-electing to the Board Mr. H. G. H. Norman and Mr. T. Easton Devonshire, who had been provisionally appointed by the Directors to the seat occupied by the late Mr. C. Crew. The Auditors (Messrs. Deloitte, Dever, Griffiths, and Co.) having been re-appointed, the proceedings terminated.

ODESSA WATER-WORKS COMPANY, LIMITED.

The Proposed Acquisition of the Works by the Municipality.

The Ordinary General Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Sir ARTHUR CLAY (in the absence of Sir Peter Spokes through indisposition) presiding.

The report and accounts (which were noticed in the JOURNAL last week) having been taken as read,

The CHAIRMAN observed that the Directors thought the report and accounts were satisfactory to a certain extent in comparison with those of some former years, inasmuch as two of the lawsuits had at length been decided by the Senate in the Company's favour. This had enabled the Board to pay off the balance of the temporary loans, and to recommend the payment of a dividend of 4s. per share to the "A" shareholders; the financial result of the lawsuits to the Company being more than £20,000. With reference to the proposal which had been shadowed forth by the Commission of the Douma as to the acquisition of the works, as the shareholders were aware the concession provided a basis by which their right to purchase the undertaking matured in December last; and if the town had thought proper to exercise that right, the Company would have had no voice in the matter. The Commission appointed by the Douma to consider the question had, however, formulated an alternative scheme, which practically amounted to this: That, instead of paying a lump sum as the purchase price, they should pay an equivalent annuity for the remainder of the concession. This was not provided for by the concession; and it could therefore only be carried out by negotiation, and, moreover, such an arrangement would necessarily involve the sanction of the shareholders and possibly of the debenture holders also. The Company's Engineer (Mr. Platts) had been requested by the authorities to furnish himself with the power of attorney, and to arrange, if possible, the details of such a scheme. But even if Mr. Platts and the Commission should agree, it by no means followed that the scheme would be carried out, because the Douma might not ratify the proceedings of their Commission; and it would also rest with the shareholders to say whether or not they would confirm the arrangement. The Directors had had the opportunity of discussing the matter with Mr. Platts; and they had invested him with the necessary power of attorney. Turning to the accounts, he said the addition to the capital expenditure during the year was £3665, which was rendered necessary by the requirement of the town, after an appeal to the Law Courts, that new mains should be laid to one of the outlying districts, and by an addition to the plant at the Dniester, Hill, and Chumka stations. The most striking feature in the revenue account was a falling off of £2000 in receipts, due to the unusually wet season last year; but the expenditure showed a decrease of more than £3000. The result was that, after meeting interest on debentures and all charges, they had a balance of £11,649, as against £9087. On the whole, he thought he was justified in assuming that the report and accounts would be regarded as fairly satisfactory, in comparison with former years. In conclusion, he moved their adoption.

Mr. G. MAY seconded the motion.

The discussion which followed was long and somewhat animated. A number of questions regarding the accounts were put by Mr. Francis, who also inquired whether the Commission were proposing to take the net revenue of the past or a future year. Mr. Batley, who felt very keenly the manner in which the Company had been for years so badly and dishonestly treated by the Municipality, remarked upon the unfairness of taking the past year as a basis of negotiation, in view of the fact that the revenue had decreased owing to the wet season. Mr. Thomas could not see the necessity for granting the power of attorney to their Engineer; and Mr. Wood asked whether the amount which had been paid in settlement of the Company's claims had been included in the revenue for the year.

The CHAIRMAN, in replying upon the discussion, stated that unless they had given Mr. Platts the power of attorney, the negotiations would have been stopped; and then the Board would have had nothing to bring before the shareholders. The Directors would certainly not look at a proposal which was not quite as good as would have been the case if the Douma had proceeded to purchase under the terms of the concession, which stipulated the average revenue for the previous five years. The net revenue for the past year was £26,238; and this only included the troop money for the twelve months. As to an inquiry regarding the negotiations for an extension of the district, they, of course, remained in abeyance while the purchase question was pending. Respecting the lawsuit concerning the charge for water for household supply during the years 1889-91, if this was decided in the Company's favour about £18,000 would be added to the accounts. He could not say whether the Commission would propose to take the net revenue of the current year, or that of the past year; but, of course, this was a very vital point.

The motion was then carried.

A resolution was afterwards passed expressing the opinion of the shareholders that the meetings should be held half-yearly; the proposed dividend was also declared; and the retiring Directors (Sir Peter Spokes and Mr. E. Allen) were re-elected.

PARIS GAS COMPANY.

The Report and Accounts for the Year 1893.

The following is an abstract translation of the report of the Directors of the Paris Gas Company for the past year, with the accounts for this period in our usual condensed form.

The quantity of gas sent out for consumption in Paris and the 59 neighbouring communes served by the Company was 303,496,850 cubic metres, or about 10,713,500,000 cubic feet; being 5,404,080 cubic metres, or about 190,764,000 cubic feet, less than in 1892. Allowing, however, for the gas burnt on the 29th of February in that year—say, a million cubic metres—the difference is really only about 4,404,000 cubic metres, or 155,460,000 cubic feet. The Directors point out that this decrease is not peculiar to their Company, but has been experienced by a large number of gas undertakings. In the first half of the year, the consumption fell off to the extent of 1·48 per cent.; in the second half, to 2·01 per cent.—making 1·75 per cent. for the year. Various causes combined to bring about this state of things. In the first place, there was the slackness of trade generally, which necessarily affected the Company. Then there was the extended use of electricity, which last year was adopted in several places previously unprovided with electric cables. Lastly, there was the Welsbach incandescent gas-burner, which, although in a certain degree, mitigating the effect of the competition of electricity, caused a not unimportant diminution in consumption. While the bulk of gas burnt for lighting purposes fell off last year, the day supply increased to the extent of 2,663,300 cubic metres, or about 90 million cubic feet; the figures being 87,143,170 cubic metres last year, and 84,479,870 cubic metres in 1892. In the latter year, the proportion of day gas to the total consumption was 27·35 per cent.; whereas last year it was 28·74 per cent. These results are, of course, due to the more general use of cooking and heating appliances and gas-engines; and the placing of these articles has been greatly stimulated by the facilities afforded by the Company's show-rooms and officials for imparting information to consumers. The receipts from the sale of gas were lower last year, by 1,531,052 frs. (£61,242), than they were in 1892; the figures being 79,540,685 frs. in the latter, and 78,009,633 frs. in the former period. Of the total amount, 71,163,605 frs. came from the city, and 6,846,028 frs. from the surrounding districts. The number of consumers on Dec. 31 last was, however, greater by 8070 than on the corresponding day in 1892; the figures being 259,883, as compared with 251,813. The number of cooking-stoves lent gratuitously increased by no less than 12,356 last year; bringing up to 151,674 the total in use on Dec. 31. These appliances are now employed by more than half the Company's customers. The number of public lamps in use at the close of the year was 83,576, of which 72,091 were for lighting the city. In this total are included 2399 recuperative burners, located in suitable spots; and to these must be added 2237 similar appliances fitted up by private consumers—making together 4636 high-power burners, corresponding to 29,789 jets of the ordinary type. The number of rising mains fixed during 1893 was 1874, of which 397 were placed in new houses. Deducting 44 of these pipes removed owing to premises being pulled down, there were, at the close of last year, 36,400 in use, distributed over 28,205 houses. The number of consumers taking gas therefrom was 133,468; being an increase of 7148 on the number at the corresponding date in 1892. With the view of extending the use of gas by the occupants of apartments, the Directors, in certain cases, give special premiums to those landlords who put in an installation, and also lend them gratuitously a number of appliances which they undertake to place at the disposal of their tenants. This arrangement has only lately been introduced; and its effect is being carefully watched, with the view to its development if the results prove satisfactory. With regard to the Company's works, no noteworthy extensions of manufacturing plant were made in the course of the past year; but the distributing system was increased by 33,610 metres, or nearly 37,000 yards. This addition brought up the total length of mains to 2,332,102 metres, or about 1450 miles.

From the financial portion of the report, we learn that a net sum of 3,817,763 frs. (£152,710) was expended last year on capital account, of which 1,554,427 frs. were for rising mains, and 1,294,169 frs. for

service-pipes and meters. The capital account stood as follows on Dec. 31, 1893 :—

	Francs.		Sterling.
Amount expended to Dec. 31, 1892 . .	290,856,399	..	£11,634,256
Do. do. during 1893 . . .	3,817,763	..	152,710
	294,674,162	..	£11,786,966
To meet which there has been raised—			
By shares . . . . . 84,000,000 frs.			
By bonds . . . . . 221,185,689 „			
	305,185,689	..	12,207,427
Leaving an unexpended balance of .	10,511,527	..	£420,461

The following is the working account for the past year :—

Expenditure.

	Francs.		Sterling.
Value of gas in store on Jan. 1, 1893 .	61,360	..	£2,454
Manufacture of gas—			
Coals carbonized	21,725,002	..	869,000
Coke and tar for heating purposes .	4,455,525	..	178,221
Salaries and wages	4,925,238	..	197,010
Maintenance of works and plant . .	1,821,952	..	72,878
Incidental expenses of carbonization	1,696,424	..	67,857
Purifying materials	481,855	..	19,274
Distribution—			
Salaries of engineers and officers .	1,944,362	..	77,774
Repairs, &c., of mains and services .	1,414,039	..	56,562
Miscellaneous expenses, stamps, &c.	452,054	..	18,082
General management—			
Directors and Executive Committee	300,000	..	12,000
Salaries	1,212,269	..	48,491
Office and other expenses. . . .	463,580	..	18,543
Service, accidents, relief, &c.. . .	276,787	..	11,071
Law and other charges	32,804	..	1,312
Bad debts	5,329	..	213
Rents and insurances	310,377	..	12,415
Interest on loans	8,278,369	..	331,135
Loan redemption fund	9,446,500	..	377,860
Share redemption fund.	2,751,000	..	110,040
Cost of experiments, &c.	238,202	..	9,528
Sundry works	137,589	..	5,504
Pension and provident funds . . .	462,445	..	18,498
Municipal charges—			
Tax of 2 c. per cub. met. of gas sold.	5,262,023	..	210,481
Rent of subsoil occupied by mains,&c.	200,000	..	8,000
Lighting, extinguishing, and maintenance of public lamps (less amount paid by Municipality) . .	1,327,495	..	53,100
State charges—			
Official gas testing, stamps, &c. . .	1,150,205	..	46,008
Total expenditure	70,832,785	..	£2,833,311

Revenue.

	Francs.		Sterling.
Value of gas in store on Dec. 31, 1893	43,480	..	£1,739
Sale of gas	78,009,634	..	3,120,385
Residual products—			
Coke	14,376,163	..	575,047
Tar.	1,943,477	..	77,739
Ammoniacal liquor	1,319,782	..	52,791
Rental of meters and fittings on hire .	2,743,049	..	109,722
Fire-bricks, &c.	77,073	..	3,083
Interest and discount	1,155,802	..	46,232
Total revenue	99,668,460	..	£3,986,738
Deduct expenditure	70,832,785	..	2,833,311
Balance, profit for 1893. . .	28,835,675	..	£1,153,427
Add balance of 1892 liquidation . .	173,461	..	6,938
	29,009,136	..	£1,160,365
Deduct to meet outstanding claims .	259,136	..	10,365
Balance available for distribution . .	28,750,000	..	£1,150,000
Deduct for share dividend	11,200,000	..	448,000
Balance, divisible equally between the Company and the Municipality . .	17,550,000	..	£702,000

The total amount available for distribution among the shareholders is, therefore, as follows :—

	Francs.		Sterling.
Dividend as above.	11,200,000	..	£448,000
Half of divisible balance	8,775,000	..	351,000
Portion of annuity (now compounded) payable by Municipality	50,000	..	2,000
Balance of undivided profits . . .	123,134	..	4,925
Total	20,148,134	..	£805,925
Deduct 1 fr. per share for reserve fund.	336,000	..	13,440
Balance	19,812,134	..	£792,485
Deduct interim dividend of 12 frs. 50 c. per share paid in October last . .	2,436,450	..	97,458
Balance available for final dividend .	17,375,684	..	£695,027

The balance allowed of a further payment of 51 frs. 50 c. per share (£10) —making in all 64 frs. (£2 11s. 2d.)—and leaving 71,683 frs. (£2867) to be carried forward. The dividend is lower by 8 frs. than it was in 1892, and by 10 frs. 50 c. than it was in 1891. The reduction is explained by the lesser consumption of gas, the falling off in the returns from coke and tar, advances in salaries, &c., the allocation to the workmen of a sum equal to 2 per cent on the profits for the year 1892, and to additional expenses connected with the loan raised in 1891, the final payment of which was made in April last year. The Directors think they ought to add that the principal causes of the present decrease in the dividend—viz., the smaller quantity of gas consumed and the diminished returns from the two principal residuals—arise from atmospheric conditions, and from commercial circumstances which are susceptible of being modified very favourably in the future.

In regard to residuals, the sale of coke produced less by 2,953,638 frs. (£118,146) in 1893 than it did in 1892. During the first half of the year, stocks accumulated to such an extent that, as from the 1st of September, the Directors reduced the price to the general consumers. Ammoniacal liquor yielded about the same return as in 1892, though a smaller quantity was sold. The price of tar, however, suffered a depreciation which it was impossible to foresee. The result is shown by the figures for the two years—1,943,477 frs. in 1893, and 2,360,009 frs. in 1892.

In their previous report, the Directors informed the shareholders that they had opened several establishments for the exhibition of the various appliances employed in the utilization of gas and coke. These show-rooms are lighted by lamps of all systems, and are generally arranged to afford as much information as possible as to the capabilities of gas. Beyond these, a special department has been created at the central offices, for answering questions, whether verbally or by correspondence. That these efforts on the part of the Directors have borne good fruit is shown by the fact that the use of gas-engines, improved burners, and cooking and heating appliances has made great progress. No less than 74,000 persons visited the Company's show-rooms in the course of the past year; and the number of orders executed was 7136. Special lectures on the application of gas to cooking in general, and notably to that required for restaurants, were given several times a week; and at these were distributed pamphlets in which the various appliances were described. It will thus be seen that the Directors are desirous of enlightening the public, as far as they can, on the advantages to be derived from the use, for culinary and industrial purposes, of an agent which can be so easily and at the same time so economically employed as gas. The excellent results, which have attended their labours in this direction, afford encouragement for their continuance. Especially is this shown in the use of gas for motive power. Last year there were fitted up in Paris 223 gas-engines, representing 921-horse power; whereas in the previous year there were 191, and in 1891 only 34. The quantity of gas consumed by these engines in the past twelve months may be estimated at 5,800,000 cubic metres, or about 204,750,000 cubic feet; exceeding by 1,600,000 cubic metres, or 56,500,000 cubic feet, the consumption in 1892. The Company have lately been introducing engines of small power (¼, ½, and 1½ horse). Their value in certain classes of manufactures is unquestionable; and they have been much appreciated. The use of coke for heating purposes extended last year; 207 more appliances suitable for the utilization of this product having been sold than in the previous twelve months. The numbers for the two years were 1167 and 960. The Directors are making certain changes in the patterns of their coke-stoves, with the view of lowering their price, and thus further facilitating their sale.

The report contains, as usual, full particulars as to the provident, pension, and other funds connected with the Company; and it concludes with a few remarks on a scheme for relieving the occupants of apartments of less rental than 500 frs. per annum, of all the accessory expenses attending the furnishing of a supply of gas. Nothing is said about the gas purchase question, which appears to have been "shelved" by the Municipality.

Reduction in the Price of Gas at Walton-on-Thames.—The Walton and Weybridge Gas Company have reduced the price of gas 3d.; making it now 4s. 6d. per 1000 cubic feet.

A Large Deficit on the Huddersfield Corporation Electric Light Department.—The first annual statement of the Huddersfield County Borough Council Electric Lighting Department shows a deficiency of £2547 on the revenue account; and the Finance Committee have been requested to make provision for this in the borough rate for the current financial year.

The London County Council and the Water Companies.—At the meeting of the London County Council last Tuesday, the report of the Water Committee on the subject of the proposed negotiations between the Council and the London Water Companies for the sale of the Companies' undertakings, to which reference was made in the JOURNAL last week (p. 743), was presented and adopted.

Increase of the Rebate Allowed by the West Middlesex Water Company.—At the meeting of the Marylebone Guardians on Monday last week, the Clerk (Mr. H. T. Dudman) read a letter he had received from the Secretary of the West Middlesex Water Company (Mr. F. H. Wybroo), notifying the intention of the Company to increase, from Midsummer next, the rebate they commenced to allow in 1887 on the water-rates from 7½ to 10 per cent.; reserving to themselves the right of withdrawing or reducing it at any time, if necessary. The arrangement applies equally to private consumers and public bodies.

The Water-Works Purchase Question at Guiseley.—At a meeting of the Guiseley Local Board last Wednesday, a letter was read from the Secretary of the Guiseley Water Company (Mr. W. Walker), stating that the shareholders had passed a resolution accepting the Board's offer of £1 per share for their plant, on condition that the Board assumed all the liabilities of the Company. It was mentioned that the loans which the Board would have to pay amounted to £3583; and the share money, to £4495—making £8078. It was decided to call a meeting of the ratepayers to consider the question.

Gas Economizing and Improved Light Syndicate, Limited.—In the Queen's Bench Division of the High Court of Justice last Wednesday, before Mr. Justice Cave, an action was brought by Messrs. Noakes and Co., to recover £28 1s., the price of twelve 80-gallon drums supplied to the defendants for the purpose of carrying liquid hydrocarbons. Mr. R. Gill appeared for the plaintiffs; and Mr. Pollock represented the defendants. Mr. Pollock said he could not contest that the plaintiffs were entitled to recover something for the goods supplied, seeing that the defendants had dealt with them; but his case was that the drums were defective and leaky, and that it would cost about £1 each to make them fit for use. Having read a letter from the plaintiffs in which they said the drums were perfectly liquid-tight, and tested, he called two or three witnesses to prove that when used they were leaky. His Lordship, however, without calling upon the plaintiffs' Counsel, gave judgment for them for the amount claimed, with costs on the County Court scale.

STALYBRIDGE CORPORATION GAS-WORKS.

Annual Report.

The Engineer and Manager of the Stalybridge Corporation Gas-Works (Mr. E. A. Loam) has published his report on the working of the department during the year ending March 25 last. He says the amount of coal and cannel carbonized was 13,070 tons, against 12,001 tons in the previous year; or an increase of 1069 tons. The make of gas per ton of coal was 10,548 cubic feet, compared with 10,726 feet. The quantity of gas made was 137,873,300 cubic feet, against 128,728,400 feet, or an increase of 9,144,900 feet. The amount of gas sent out was 137,874,500 cubic feet, against 128,721,400 feet, or an advance of 9,152,800 feet. The quantity of gas sold per ton of coal carbonized was 8377 cubic feet, as compared with 8938 feet. The cost of coals, after deducting the amount received for residuals, amounted to £6037; and the working expenses for manufacture, distribution, &c., to £5950—making a total cost of £11,988, against £11,226—equal to 18s. 4·12d. per ton of coal, against 18s. 8·51d. The average illuminating power of the gas supplied during the year was equal to 19·03 candles. The quantity of coke produced for sale was 4337 tons, against 3650 tons in the preceding year; or an increase of 687 tons. The quantity of tar and liquor sold was 2491 tons, against 2210 tons last year, or an increase of 281 tons. Referring to the coal strike, Mr. Loam regrets to say the department suffered much loss and inconvenience in consequence of having to purchase coal of an inferior quality; but the public had no reason to complain that the Corporation failed in their duty of giving them a full supply of gas of the quality they are required to provide. When the dispute commenced, they had three months' stock of coal in hand; but the Committee had soon to go into the open market to buy on the best terms they could obtain. Turning to the hire and sale of stoves, Mr. Loam reports that this branch is steadily on the increase; and he takes the opportunity of pointing out the many advantages of domestic gas appliances. In conclusion, he congratulates the Committee on having satisfactorily completed the past year.

PROPOSED EXTENSION OF THE TEIGNMOUTH GAS-WORKS.

The Manager of the Teignmouth Gas-Works, Mr. J. H. Portbury, submitted to the Local Board last Tuesday a report on the subject of the extension of the gas-works. The works were, he said, at present inadequate to meet the slightest increased demand during the coming winter; and extension was therefore necessary for the efficient lighting of the town. His scheme included the enlargement of the present retort-house to its fullest carbonizing capacity, and the erection of five new benches of retorts, which would raise the productive power of the house to 260,000 cubic feet per day. He also suggested an addition to the purifying plant, and the re-arrangement of the house to the centre-valve principle. It was also, he pointed out, necessary to erect a new gasholder of a capacity of 220,000 cubic feet, which, added to the present storeage of 40,000 cubic feet, would give a total of 260,000 cubic feet, and place the gas-works on a safe footing for twenty years. He also proposed to lay a new 12-inch main from the works to the centre of the town, and to connect it to a cast-iron distributing chamber, whence branch mains would take the supply in various directions. Provision would be made for carrying the gas over Shaldon Bridge, if it was at any time thought necessary to light that district. The estimated cost of the extensions was £10,950; but if they took the foreshore, as had been recommended by the Harbour Commissioners and the Board of Trade, the cost would be £12,150. Mr. Portbury strongly recommended the latter scheme, as being more comprehensive, and most in the present and future interest of the works. In view of the increased lighting at the railway station and the extra general consumption, the work of extension should, he thought, begin at once; and the responsibility of delay must rest with the Board. The Chairman (Mr. Harris) presented a report of the Gas Committee, who recommended that the question of extending the works should be considered by the Board; and he added his own expression of opinion that the matter was an unfortunate one for the town. Some discussion followed, in which it was stated that the gas-works were not remunerative because the price of gas had been reduced; while during the coal strike an enhanced price had to be paid for coal. The Manager said that if the Board decided to supply Shaldon with gas, the cost would be £1500 in addition to the amount of his present estimate. The Board ultimately decided to leave the whole question over for the decision of the District Council, who will take over the power and duties of the Local Board in November. Meantime, the present sulphate of ammonia plant is to be repaired, at a cost of £50.

Exhibitions of Gas Appliances.—During the week ending April 21, Messrs. Fletcher, Russell, and Co., Limited, held a successful exhibition of their gas cooking-ranges and heating and other appliances at Sunderland.——A series of exhibitions are being held by the Kingston-on-Thames Gas Company, accompanied by lectures by Mrs. Page. The exhibition was open at Kingston during the week ending the 21st ult.; at Teddington, last week; and it is being held at Surbiton this week.——An exhibition of gas appliances, combined with free cookery lectures, was held in the Albert Hall, Shandwick Place, Edinburgh, last week, by Messrs. R. and A. Main. The lectures were given twice daily by Mrs. Hall. The same firm has also been exhibiting at Peterhead, with Miss Burden as the demonstrator.——Last Tuesday, an exhibition of gas cooking, heating, and lighting appliances was opened by the Scarborough Gas Company, in the Old Town Hall. The stove exhibits were by Messrs. John Wright and Co.; and cookery lectures were delivered by Mrs. J. B. Thwaites.——An exhibition was held last week, with gratifying results, in the Town Hall, Luton, by Messrs. W. Parkinson and Co., who had Miss Edith Sanderson (first-class diplomée of the National School of Cookery) as their exponent of the utility of gas as a cooking and heating agent. This firm has also recently exhibited at Dunstable.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is somewhat of a misfortune for me that nearly all the proceedings out of which I could make this week "Notes" that would be in any degree interesting to your readers, took place in your own neighbourhood. So many Bills relating to Scotland have been before Parliamentary Committees, that all our leading citizens have been at Westminster. For a long time, it is well known, some have complained of the arrangement of public business which every year requires so many public and professional men to repair to London to advocate local measures. There has just been introduced into Parliament a Local Government Bill for Scotland, the provisions of which I have not seen; but I do not expect that it will touch upon the subject. The other arrangement of this week, for the reference of Scotch measures to a Grand Committee, only affects, so far as I can learn, the House of Commons; and, besides, I do not expect that the Grand Committee would condescend to perform the functions of a Committee to hear evidence. Therefore, I presume, the subject is left where it was. In that, I confess, I see nothing prejudicial to Scotland. The agitation for the holding of parliamentary inquiries in Scotland has been mostly conducted at the instance of members of the Scotch Bar, who doubtless expect that, were such inquiries held at home, some of the spoils of the legislative battles might fall to them. So far there would be no harm; but I know well that, although inquiries were to be made locally, whenever a question of importance arose, senior counsel would be brought from London. The matter thus resolves itself into whether it is cheaper to take witnesses to London at small fees, or to bring counsel from London at exclusive, and therefore exorbitant, fees. I think it would be found that the present method is the cheaper—particularly when it is also taken into account that many of the skilled witnesses who are examined in support of Scotch measures are English professional gentlemen.

The most important, to your readers, of the Bills before Committees this week have been the rival Bills of the Falkirk Gas Company and the Falkirk Corporation. The issue of the contest is just as I expected—the Corporation have bound themselves before Parliament to take over the undertaking of the Gas Company, and no terms have been fixed, or even hinted at. I hope the Corporation are satisfied. They, indeed, seem to be so, for on receipt of the intelligence, on Wednesday, that the preamble of the Corporation Bill had been proved, the town bells of Falkirk were rung; and they were rung again on Thursday, when it was learnt that the Gas Company had withdrawn their Bill. Both parties went into the fight prepared to arbitrate; the difference between them being as to whether the Company were to be allowed goodwill or not. They came out of it with a pledge by the Corporation to acquire the Company's undertaking by arbitration, before they take any other step, and an instruction from the Parliamentary Committee (to be read into their finding) that the Arbitrator shall take all the circumstances into account. The arbitration is to proceed in the usual manner under the Lands Clauses Act; and as the procedure will be regulated by custom, goodwill will be considered. Whether it will be allowed, will not depend so much upon the Arbitrator as will the amount which he will grant. Recent experience in connection with tramway transfers will doubtless be quoted, to endeavour to set up the theory that the Legislature is now opposed to the principle of paying for goodwill when a corporation undertakes a local company's business; but against that there is this to be said, that the Legislature, in the General Tramways Act of 1870, laid down the provision directly that the Arbitrator should not take into account past or future profits. Besides, it is to be observed that this instruction is not recent, but is 24 years old; and tramway companies have existed all along in the knowledge that corporations would decline to pay for goodwill. Gas companies, however, have had no such knowledge; and, indeed, several gas transfers have taken place since then in which goodwill has been allowed for. The Falkirk Gas Company, therefore, have good reason to be satisfied with the result of the contest before the House of Lords Committee, except that they have not got their expenses—a state of matters which agrees entirely with what I wrote in the JOURNAL for March 20 last. They will, in reality, get the true value of their undertaking, which is all that they could look for. The tug of war between the Corporation and the Company has still to come. All that has taken place is simply arranging as to how the warfare is to be conducted. And at what a price has the preliminary arrangement been obtained! That price, too, will be very considerably augmented when the expense of the arbitration comes in. The costs of both proceedings, if added to the terms offered by the Corporation, might have gone far to have brought about a private arrangement.

As to the course of the arbitration itself, it is almost premature to speak. There is no doubt that the Corporation will tender the evidence of Mr. J. A. Molleson, C.A., of Edinburgh, backed up by others, as to the handling of the shares of the Company; but it is doubtful whether it can be received. The Arbitrator's consideration cannot be directed so much to the structural valuation of the works, as to their profit-earning power; because it is admittedly the position of both parties that the works are worked out. In that view, to prove a small structural value and a large dividend would be to raise the value of the goodwill; while, on the other hand, to prove a large outlay upon the works would be to put up the share capital. It will also be difficult for an Arbitrator to take into account the rent which a hypothetical tenant would pay for the undertaking, because the removal of the works creates a state of matters which no tenant could very well estimate. The arbitration is thus likely to be a more than usually difficult and protracted one, which will mean more work for the lawyers, and more outlay which the gas consumers will have to pay.

I must say I would still advise a private agreement. What separates them? According to Mr. Molleson, the capital of the Company is certainly under £50,000; and according to Mr. H. E. Jones, of the Commercial Gas Company, new works can be erected for £30,000. That makes £80,000 altogether, supposing the Company were to be allowed their full capital, and the Corporation were to expend £30,000 upon new works and plant. If the Company were given 8 per cent.

annuities upon £50,000, the charge would be £4000 a year; and 3½ per cent. upon £30,000, would make an annual charge of £975. The output of gas is 71 million cubic feet a year; the net cost of which ought not to exceed 2s. 6d. per 1000 cubic feet, or £8875. This makes a total annual charge of £13,856, to meet which would require gas to be charged at nearly 3s. 9d. per 1000 cubic feet, which would be a reduction of 5d. at once on the present price of gas. But Mr. Jones expects that the Corporation would save other £1696 a year in reduced leakage, expense of cartage, &c., which would make the annual charge £12,154; and to meet this gas would have to be sold at not more than 3s. 6d. per 1000 cubic feet. The question then would be how much, if any, less than 3s. 6d. would be a reasonable price for gas in Falkirk; and if a less price were required, whether it should or should not come off the annuities. I do not think, considering the prices in other places, that 3s. 6d. is an extravagant figure to begin with; and therefore an offer on the basis of 8 per cent. annuities on the present capital of the Company would be a fair one. The advantage of taking over the undertaking on the above terms is seen when it is reckoned that, instead of an annual charge of £4000 for annuities, had the Company got their Bill, and expended the whole of their £90,000 of proposed capital, the annual charge to meet the 8 per cent. dividend would have been £7200. Of course, these are only theoretical calculations, based upon figures which came out in the inquiry, and upon common knowledge. That they will not be heeded I know, because, somehow or other, when these subjects get into the hands of professional gentlemen, they must go through the mill "with that uniformity of method and independence of circumstances" so happily brought out by George Eliot in regard to the education of young Tom Tulliver, whose father's desire that the lad should be taught mapping and summing was interpreted by his teacher to mean stern grinding in Euclid and Latin.

If the JOURNAL were a comic paper, what amusement its readers would have were I to republish an article on "Oil Gas," which appeared in the columns of the Glasgow *Evening Citizen* on Tuesday last. Verily a little knowledge is a dangerous thing, or, to vary the expression, to the average journalist a little knowledge of gas matters is something upon which he can play the most fantastic tricks. The article starts with the intimation that the Glasgow Corporation have been experimenting with oil, as a substitute for cannel, "at their Dawsholm works;" and then proceeds to say that the advent of the Peebles oil-gas process has brought to the front Lowe's patent, which is so much in use in America that fully 60 per cent. of the gas produced on that continent is made according to it. Having by this preamble established his acquaintanceship with gas making in both the Old and the New World (an object to which many of your most expert writers would be glad to attain), the writer proceeds to inform his readers that the Lowe patent is a gas-making process, while the Peebles system is, more correctly speaking, a gas-enriching process. What a jumble is here; because both are gas-making processes, and both are used as enrichers. As matter of fact, Mr. A. Wilson, of the Dawsholm works, said at the recent "informal" meeting in Glasgow that they were using the Lowe gas merely as an enricher. Then follows a long passage upon oils, in which it is stated that the object of Mr. Glasgow, the representative of the Lowe process in Glasgow, is to enable the Corporation to manufacture gas from any quality of oil, and not to be bound down to those of from ·840 to ·850 sp. gr., which are largely used by railway companies. The total quantity of oil of the above gravities, according to the writer, which the Scotch oil companies could produce, is only about 10,000 tons a year; and if oils up to ·900 sp. gr., excluding burning paraffin oils, were used, the production would only be from 47,000 to 50,000 tons annually. That may be all very true; but when the writer goes on to say that, considering that so many towns (enumerated, but not accurately) have adopted the Peebles process, and others are considering the matter, the Glasgow Corporation have done well in being careful not to rush into any particular manner of gas making from oil, as it would be seen that the addition of large cities like Glasgow would easily lead to the consumption of more oil than the whole Scotch make, it is difficult to follow his reasoning. He professes to be afraid of a large rise in the price of oil; but in the next paragraph he states that, although the present price of oil were doubled, the manufacture of gas from it would still be much cheaper than from gas coal. There is no distinction of processes here; and it is only by inference that a conclusion can be come to. That inference is that the Peebles process would be likely to lead to an advance in the price of oil which would be unwelcome; but that, if the Lowe process were adopted, the price might be doubled, and the manufacture of gas from oil would still be profitable. If that were the meaning intended, as it is the only intelligible meaning, no harm would have been done in stating it. The next paragraph again introduces the Lowe process, and states that at Dawsholm gas of a much greater illuminating power (than what is not stated) can be produced at a cost of from 1s. to 1s. 6d. per 1000 cubic feet. This is the centre-piece of the article; and it shows that what the writer was endeavouring to do was to write a description of the Lowe process as it is worked in Glasgow, but that he got mixed up—probably from want of data with reference to it—with the Peebles process. It will be remembered that, at the "informal" meeting, data could not be given of the Lowe process as worked in Glasgow. This seems to be nothing to the writer, so long as he can cull from another system. This he proceeds to do, in a description of the Peebles plant and process—certainly not of the Lowe plant and process in Glasgow. He says that, at most gas-works, it is not necessary to pump oil, but that it flows by gravitation into the retort (which it manifestly does not do in the Glasgow works, for there is no retort for oil); and that the only oil, as a rule, which has to be pumped is that which is required for washing gas in the scrubber. That is again the Peebles process; and the next paragraph must refer to it also, for he speaks of the only attention requisite being to the heating of the retorts, regulating the flow of oil, and the withdrawing of the coke as it accumulates. Having bestowed so much attention to the Peebles process, the writer thinks it time to return to the Lowe; and he then gives the information that only one man is required at the Dawsholm works. That is, of course, nonsense, because one man does not do all the work of the Lowe plant in Glasgow, any more than one man does all the work of the Peebles process (say) in Perth, where it is at work. Most writers, as well as speakers, like to have a striking passage for conclusion; and the author of this article, following that rule, reserves his great stroke to the end. "The following," he says, "may be taken as a very fair summary of the results obtained from *the decomposition of various oils differing in specific gravity and constitution*." Then is given a table which, with the words in italics, is copied, with the exception of one word—"power" being substituted for "value" in one of the headings—from the paper read by Mr. A. Bell, jun., of Peebles, at the North British Association meeting at Dundee in July last, descriptive of the results got by the Peebles process, and which will be found in the JOURNAL for Aug. 8 (p. 266). There is plainly something wrong, because the article in the *Citizen* is one dealing with the Lowe process in Glasgow, and the results given in the table were never obtained in Glasgow, nor by the Lowe process at all. Besides, after having delivered himself in favour of the Lowe process, to the effect that the object aimed at was to get a system which would not be confined to oils of ·840 or ·850 sp. gr., he gives a table in which the lowest gravity oil is ·845, and the highest 1·150. Such a hotch-potch of an article I never saw. Had the writer applied either to Mr. Glasgow or to Mr. Young, of Peebles, he would have got descriptions that would have been accurate; and if he wished comparisons, he could have inserted both. It is difficult to say where he could have obtained his information. Reasoning from internal evidence, one would say he did not get it from anyone who knew either of the processes. If Mr. Glasgow had been his informant, he would not have been likely to have given the cost of production to a newspaper man, when he could not give it to gas managers at the "informal" meeting; and besides he would not have fallen into the error of describing plant as being in the Dawsholm works which is not there at all, but in the Temple Farm works. Had Mr. Young been his informant, he would not have been likely to have put him off with a table of results which is now nearly nine months old. Altogether, the article is an enigma to me; and I only give prominence to it because I cannot see how either Mr. Glasgow or Mr. Young can allow it to pass without pointing out its absurdity.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 28.

Sulphate of Ammonia.—There is no improvement as far as the spot market is concerned; and prices continue to decline gently. This is in marked contrast to what is passing in future deliveries, which have been largely inquired for; and a considerable business has been done at quite 10s. advance on present values. As the bulk of the orders has come from France—a country which abstained so considerably from taking the usual supplies this spring—this gives a satisfactory proof not only of future requirements, but also of the absolute need of sulphate. The principal transactions rotate round summer delivery; and it may be assumed that the larger portion of the production during that period has been dealt with. It has become no doubt clear to consumers that the assurance of supplies during the months of short production cannot remain a matter of absolute indifference, since it is now positively ascertained that the consumption of coal gas is showing an almost general decrease; and there will, of course, be a corresponding decline in the production of sulphate. It would not be a matter of surprise to find this year's production of sulphate eventually below that of last year, notwithstanding the probable increase in the Scotch output. Quotations are: Prompt delivery, £13 to £13 2s. 6d.; and summer contracts, £13 10s. to £13 15s. Nitrate is easier, at 10s. 4½d. per cwt.

LONDON, *April* 28.

Tar Products.—A little more business is doing in this market. Pitch continues steady; and, with a considerably lessened production, the price is not likely to go lower, notwithstanding the ruinous competition in the coal market. Anthracene continues strong at Committee prices. There is considerably more demand for carbolic acid; and the ensuing season is likely to be a good one for this article. The price of benzol continues weak; but the extraordinarily low price of 90's has now attracted buyers—considerable business being reported at the price quoted below. Solvent naphtha is also in healthy request; and, as will be seen, continues dearer than benzol—an anomaly which only once in the history of the trade has been recorded. Creosote and common oils are still largely used for fuel purposes, especially where the latter is costly. This is a fortunate circumstance, as there appears to be very much more produced than is wanted for the usual outlets of these articles. Business has been done during the week at the following prices: Tar, 12s. 6d. to 15s. 6d. Pitch, 27s. Benzol, 90's, 1s. 1d.; 50's, 1s. 4d. Solvent naphtha, 1s. 2½d. Creosote, 1¼d. Creosote salts, 25s. Toluol, 1s. 8d. Cresylic acid, 1s. 1d. Crude benzol naphtha, 30 per cent., 5¾d. Carbolic acid, 60's, 1s. 8d. Anthracene, "A," 1s. 1d.; "B," 10½d.

Sulphate of Ammonia has completely collapsed for spot delivery—business having been done as low as £13 in various quarters; but for forward delivery 10s. to 15s. more is possible. Fortunately there are no stocks of sulphate; and it is a remarkable thing that the price should have fallen so suddenly in the face of a large home consumption, the advancing price of nitrate of soda, the lessened production, and the non-existence of stocks. Gas liquor is worth 9s. to 11s. per ton.

The Price of Gas at Stalybridge.—The Gas Committee of the Stalybridge Corporation last Tuesday resolved to revert to the charge of 2s. 10d. per 1000 cubic feet of gas. It will be remembered that the price was raised to 3s. 4d., with the view of clearing off a deficit of £1030, caused by the increased expenditure incurred during the coal strike. The extra 6d. has realized during the past quarter the sum of £967; leaving still a small deficiency, which, however, the Committee confidently expect will be met out of the ordinary income during the current three months, enabling them, therefore, to fulfil their promise to their customers not to impose the augmented charge for more than one quarter.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position generally remains much as reported last week. There has been no further official reduction in list rates with the commencement of the month; but in the open market the tendency of prices, so far as outside sellers are concerned, continues in a downward direction. All descriptions of round coal hang more and more upon the market. The miners have hesitated about taking any definite step for a compulsory restriction of the output, until the matter has been discussed at the approaching international conference; but whether the miners themselves take any action or not would seem to be of not much consequence, as collieries, with few exceptions, are already restricting their output beyond what is actually proposed by the Miners' Federation. With regard to gas coals, one or two important contracts are coming upon the market; but it is questionable whether buyers will be in any hurry to settle, with the present outlook of the market. There is certain to be some attempt on the part of the coalowners to carry out the understanding come to, that they shall only tender on the basis of 1892 prices. But there is very little expectation that this can be carried out with any really effective results; and the possibility of getting 6d. above last year's prices is now being talked of very generally as the outside that can be looked for. So far there is nothing doing in gas coals to form any basis upon which prices can be quoted; and they can only be taken relatively in comparison with the rates that are ruling for other descriptions of round coal. For best Wigan Arley coals, although coalowners are in some cases holding out for 12s. per ton, 11s. to 11s. 6d. would seem to be about the prices at which buyers could place orders; Pemberton four-feet and seconds Arley average 10s. to 10s. 6d.; whilst the lower descriptions of round coal range, according to quality, from about 7s. 6d. up to 8s. 6d. and 9s. per ton at the pit mouth, for inland sales. For shipment, however, substantially lower prices than these are taken. Ordinary steam coal can be bought at as low as 8s. 3d. to 8s. 6d. per ton, delivered at the ports on the Mersey; whilst round coal from other districts is coming in at excessively low figures—being offered in some cases, delivered free, at under the prices that Lancashire colliery owners are asking at the pit mouth. Supplies of engine fuel are rather more plentiful in the market, owing to considerable quantities coming in from other districts; but prices are still well maintained at about late rates. Burgy and through-and-through coal range from 6s. 9d. up to 7s. 3d.; best slack, 6s. to 6s. 6d.; with common sorts, 5s. to 5s. 6d. per ton at the pit mouth.

Northern Coal Trade.—There has been, with the opening of the Baltic trade, a fuller demand for steam coals; and buyers in other countries seem disposed to lay in stocks of coal. Best Northumbrian steam coals are now in great request, and the collieries are working fully; so that the production is larger both of best coal and of small. Best steam is quoted at from 10s. to 10s. 1½d.; second kinds are from 9s. to 9s. 6d.; whilst steam smalls vary from 4s. 6d. to 4s. 9d. per ton f.o.b. For manufacturing coal, there is a fairly good demand; but the supply is at least quite adequate, and there is no variation of moment in the prices. In regard to gas coals, there is now a larger demand for export; and some shippers are taking advantage of the full supply of steamer tonnage to charter forward at low freights. Best Durham gas coals are quoted from 7s. 3d. to 7s. 6d. per ton f.o.b., though for one or two exceptional qualities 8s. per ton is asked, and has been paid. In regard to coke, the low exports continue; but there is an increase in the demand for the local and north-western iron trades. The f.o.b. price varies from 13s. to 14s. per ton. Gas coke is now in rather more limited supply; whilst a few shipments for export to the Continent continue, and help to keep down the stocks at the works. There is no alteration in the prices of gas coke.

Scotch Coal Trade.—The outlook is still darker. Except for ell, there is little demand for any sorts. Every week is adding to the list of contracts which are being secured by coalowners in England and Wales, which are at present held in Scotland; and when existing contracts run out, there is anticipated a period of dulness. It is already being felt that a reduction in men's wages is inevitable; and the men seem to be aware that they are unable to resist the reduction when it comes. There are very few contracts on offer now; and this fact, with the continued small demand for steam coal at home (which is a puzzling circumstance to coalowners, seeing that steel-works are very busy), gives promise of anything but good trade in the summer. The prices quoted are: Main, 6s. 9d. to 7s.; ell, 8s. 3d. to 8s. 6d.; splint, 7s. 9d. to 8s.; and steam, 9s. to 9s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 163,232 tons—an increase over the preceding week of 27,373 tons, and as compared with the corresponding week of last year, of 27,582 tons. For the year to date, the total shipments have been 2,133,231 tons—an increase upon the quantity shipped in the same period of last year of 325,063 tons.

Gas-Works Extensions at Colne.—A Local Government Board inquiry was held at Colne last Wednesday, touching the Local Board's application for sanction to borrow £11,500 for gas-works purposes. It was stated that the Board purchased the works in 1877 (when the population of the town was 9000) for £33,000, and had expended altogether £67,000 upon them. The works had been remodelled, with very satisfactory results. In the depth of winter, the consumption of gas, with the factories and shops lighted up, was 120,000 cubic feet per hour. As the storeage capacity at the works was 450,000 feet, there was only four hours' supply stored. No provision was made for accident or any emergency; and the town was in a very precarious condition with regard to its gas supply. The retort-house was capable of extension; and the purifying and other plant could deal with the manufacture of 1,500,000 cubic feet daily. The Board proposed to erect a gasholder to accommodate 500,000 feet of gas, and thus double the present storeage capacity. It transpired during the inquiry that the Board had provisionally accepted a tender for the new holder for £6100; and as £7500 had been allowed for this purpose in the £11,500 which formed the subject-matter of the inquiry, the Inspector (Major-General Crozier) reduced the gross amount by £1100, allowing £6400 for the holder. He suggested that the Board should apply for the £1100 for certain other works they contemplated executing.

Sales of Shares.—Last Thursday, 64 fully paid up £10 shares in the *Whitby Water-Works Company* were sold at from £19 10s. to £20 2s. 6d. each.——Among some miscellaneous shares sold publicly at Boston yesterday week were three old £10 shares in the *Boston Gas Company*, which realized £18 each.

Extension of the Electric Lighting Plant in Dublin.—The Dublin Municipal Council last week accepted the tender of Messrs. Fowler and Co., amounting to £8050, for the extension of the electric lighting works. It was stated that new customers were being added every day, and that during the past quarter the receipts were £1700 in excess of the corresponding period of last year.

Fylde Water-Works Company.—The half-yearly meeting of this Company was held last Wednesday—Mr. E. Birley, J.P., presiding. The report and accounts, a summary of which appeared in the JOURNAL last week, were adopted. It was explained that Mr. Dunderdale had had to resign the chairmanship on account of ill-health; but it was expected that he would retain a seat on the Board. The usual dividends were declared.

Singapore Gas Company, Limited.—In the report which the Directors of this Company will present to the proprietors at the annual general meeting next Thursday, they express regret that the working for the half year ending Dec. 31 last was unsatisfactory. There was a small improvement on both the public and private gas-rentals; and the profit on fittings advanced slightly. These increases were, however, more than absorbed by the heavy loss on exchange and the extra cost of coal. Economy has been exercised in every possible manner by the Manager (Mr. H. Willis Smith); and, though he has kept the works in good repair, it has been done at the least possible expense. During the six months, 22 extra public lamps were put up; and there was a small addition to the number of private consumers. At the last half-yearly general meeting, it was announced that a renewal of the public lighting contract was under consideration for a further term of two years, from the 24th of May, at the rate of $2·60 per lamp per month. Unfortunately, since that time, the rate of exchange has fallen so low that the Directors felt they were not justified in signing the contract; and they have written to Singapore stipulating for better terms. The Directors also, on account of the exchange, have cabled the Manager to increase the price of gas supplied to private consumers, as from May 1, to $4 per 1000 cubic feet, instead of $3 as previously; the discount remaining as before. After several writings off, the principal of which was £346 12s. for depreciation of the stock of fittings, the available balance is £1074, which the Directors recommend to be carried to the profit and loss account of the current half year.

Coalowners and Gas Coal Contracts.—An important meeting of colliery owners in South Yorkshire and North Derbyshire who are interested in the gas coal contracts now under consideration was held on Monday last week at the Royal Victoria Hotel. The proceedings were strictly private; but it is understood that the object of the meeting was to endeavour to secure concerted action among the owners as to the prices that shall be insisted upon in the contracts now about to be placed, and that those present agreed to ask higher rates than were accepted last year. "It is the opinion of many authorities on the trade," says a Sheffield contemporary, "that serious trouble between the miners and mineowners this year on the question of wages can only be averted by the payment of higher prices for their coal by the great gas corporations. In several contracts which had to be settled earlier than the majority, the gas companies have conceded advances of from 9d. to 1s. per ton; and it is believed that the remainder will agree to pay similar prices. In some quarters it is thought that the gas companies will not attempt to resist the demand for higher prices, especially if the owners urge that an extra 6d. or 1s. per ton on the gas contracts will enable them to work remuneratively at the existing rates of wages. Whether this be so or not, the owners appear to be in a most favourable position to enforce their demands. Most of the railway companies are paying more for coal than last year; and every large gas coal producing colliery concern in South Yorkshire and North Derbyshire is organized in the Association which met on Monday, with but one exception—viz., the Hoyland Silkstone. If they are able to fix a minimum price and every member remains loyal, there is practically nothing to prevent their object being attained. Gas contracts in this district usually commence at the beginning of June, some a little earlier."

Progress of Electric Lighting at Kingston-on-Thames.—In the minutes submitted by the Lighting and Market Committee at the meeting of the Kingston Town Council on the 19th ult., they sought to be authorized to make application to the Local Government Board for permission to borrow an additional £6000 for electric lighting purposes. They also reported that the Gas Company had informed them that the cost of supplying gas for motive power for working a small dynamo at the electric works would be the ordinary rate of 3s. per 1000 cubic feet. A full statement showing the financial position of the Committee was submitted. From the capital account, it appeared that of the £10,000 loan for electric lighting, there remained a balance in hand of £4112. The revenue account showed that the expenditure up to March 25, including the arc lighting, was £729; and the income from consumers was £349 18s. The balance-sheet disclosed a net deficiency of about £11. The total estimated expenditure for the ensuing six months was £2559, of which £2159 was to be provided by a lighting rate. The adoption of the minutes was moved by Mr. Collings, who, alluding to the proposal to borrow a further £6000, explained that, in the original estimate, no sum was included for house connections or meters. The small dynamo and gas-engine to which reference was made in the minutes was for use during the summer months, and especially for the supply of the day consumers. Concerning the provision of further plant, he remarked that, on a former occasion he stated that the existing installation was sufficient to supply 5000 lamps fixed, or 2500 burning at one time. Over 3000 lamps were now connected; most of them being shop lamps, and consequently burning at the same time. Day after day further applications were being received; and before next winter, they must put down another dynamo and engine. The minutes were adopted.

The Sanitary Condition of Worthing.—Our readers may remember that, after the epidemic of typhoid fever at Worthing last year, Mr. J. Mansergh was consulted as to improving the drainage of the town. His recommendations in this regard are now being carried out; and a fresh supply of excellent water is being obtained from tube-wells sunk to the north of the town.

The St. Pancras Electric Lighting Scheme.—At a recent meeting of the St. Pancras Vestry, Mr. Sweet presented the accounts of the Electricity Committee for the past year. He said there was every reason for the Vestry to be gratified with the financial result. The most interesting part was the revenue account; and though it showed a very small balance in hand, yet it was gratifying to know that they had covered the loss incurred on the first year's working. Up to December, 1893, the capital outlay was £96,085; the total income for the year was £15,021; repairs cost £96; insurance, £56; and all the working expenses of the undertaking, £6212. So that, supposing the Committee had determined to pay 5 per cent. interest—which would be a handsome interest after two years' working—involving £4800, a balance of £1412 would be left in hand, which could be set aside for depreciation and unexpected losses. This, he considered, was extremely satisfactory. There were some who said that the revenue had been made out of the public lighting. The Committee, however, had been quite straightforward, and had charged the Vestry 6d. per unit for the current supplied—the same as private consumers were charged—and they had measured the current at the station, and not at the lamp-posts, though there was a certain amount of loss in transmission. A sum of £13,000 had been spent on public lighting. He considered the Vestry should be satisfied with the results of the undertaking.

The Liability of Water Companies for Accidents caused by Stopcocks.—An action brought by Mrs. Chapman, the wife of a licensed victualler, of Manchester, against the Fylde Water-Works Company engaged the attention of Mr. Justice Day and a special jury, at the Manchester Assizes, last Tuesday. It appeared that, in April of last year, Mrs. Chapman was staying at Blackpool for the benefit of her health; and, on the 15th of that month, while walking along Wellington Road, she tripped and fell over the cover of a stopcock connected with the pipes through which the defendants supply water to Blackpool. She received a severe shock, and was injured about the arm and shoulder. The cover, it was stated in evidence, was not properly fixed; and it was in consequence of the negligence of the defendants in allowing this, that the accident occurred. Under these circumstances, damages were claimed. The defence was that, at the time of the accident, the street was not a public thoroughfare, but a private street; that the service-pipe and the stopcock connected with it were not the property of the Company, but were put down by them by the order, and at the cost of, the owner of the property; that the work was well done; and that, if the plaintiff had used reasonable care, she would not have stumbled and injured herself. The jury were directed to confine their attention to the question of fact, whether the plaintiff met with the accident by reason of the defective condition of the cover of the stopcock. They answered this question in the affirmative, and assessed the damages sustained by the plaintiff at £40. His Lordship postponed judgment, pending his consideration of the legal question as to whether the Company or the owner of the property was liable for the condition of the stopcock. On the following day, his Lordship stated that he had come to the conclusion that the defendants were the persons responsible for the negligence which caused the accident. They were not the absolute owners of the stopcock; but it was under their control. It was put down at the request and expense of the owner of the premises; but, by the regulations of the Company, he could in no way interfere with it. The representative of the Company (Mr. Overend Evans) pointed out that this was a very important matter for them, inasmuch as there were 10,000 stopcocks in Blackpool; and he asked his Lordship to stay execution in view of an appeal. Justice Day granted a stay for fourteen days.

The East London Water Company and the Recovery of Water-Rates.—At the Worship Street Police Court last Tuesday, the East London Water Company, represented by Mr. Cole, one of their collectors, appeared as complainants in 34 summonses taken out against certain householders for non-payment of water-rates. Several of the defendants answered, asked for time, and were ordered to pay; while others were stated to have settled. A case against a draper, named Kyffin, of Hackney Road, was then called; Mr. Young, solicitor, of Stoke Newington, defending. Mr. Young took a preliminary objection that his client had been summoned for five cases, while only one summons had been taken out. The Magistrate (Mr. Haden Corser) said the Summary Jurisdiction Act precluded the preferring of more than one complaint in one summons; and the summons was therefore bad. Mr. Cole then decided to select one house for the summons; and he proved that the water-rate, amounting to 9s. 2d. for the two quarters from June to Christmas last, had not been paid. He said that the occupier or owner was bound to tender the rate in advance, and without demand from the Company. No tender had been made; but the water had been supplied. Mr. Young then said that the Company were out of Court by efflux of time. All complaints must be laid within six months. His Worship remarked that this was the general law; and he asked if the Water Company had any extra time under their Private Act. The collector was not able to point out any; but he said that the defendant never paid without trouble, and the Board had given him extra time. It was the Company's practice to take payments half yearly. Mr. Young: "Your Act says quarterly, and you must go by your Act. You took out your summons on April 4." His Worship said the objection was fatal. The June quarter was due on June 24; and the September quarter, on Sept. 29. The complaints were out of time; and the summons must be dismissed. Further cases remaining to be called were found to be out of time, and ordered to be dismissed. Then the Magistrate said that those cases which had preceded that of Mr. Kyffin might be also out of time; and on the 18 or 20 cases which had been decided being called again, the collector had to admit that, with one exception, they were all for the two quarters ending Christmas. They were therefore dismissed. His Worship remarked that possibly the Company could recover in the County Court.

Fraudulent Use of Gas at Hindley.—At the Wigan Police Court last Friday week, Richard Wilkinson, of Hindley, was summoned at the instance of the Hindley Local Board for fraudulently using gas the property of the Board. The defendant had been a gas consumer; but, having failed to pay his account, the supply was cut off. He appears to have adopted the old expedient of making a connection outside the meter by an india-rubber pipe. This was accidentally discovered; and the Board pressed for a penalty as a warning to others, and also for an amount equivalent to a fortnight's gas which the defendant admitted using. After hearing the evidence of the Gas Manager (Mr. W. Dickinson) and others, the Magistrates fined the defendant 20s. and costs.

Proposed Electric Lighting of Bradford Out-Townships.—A meeting of the Sub-Committee of the Bradford Corporation Gas and Electricity Supply Committee was held last Wednesday to discuss the question of the lighting of the out-townships with electricity. Numerous applications have been made to the Corporation to undertake the supply of the light in Heaton, Manningham, and Frizinghall, in accordance with the powers possessed by the Committee. After some discussion, it was decided to authorize the Electrical Engineer (Mr. Baynes) to prepare plans and specifications and estimates of a scheme to provide light for the townships named, with the ultimate object of extension to Allerton. The scheme will include the erection of a central station at Frizinghall.

The Public Lighting of Killarney.—According to the *Electrical Review*, a rather curious state of affairs exists at Killarney as regards the public lighting of the town. The streets there are illuminated by both electricity and gas. The public lighting has been for some time past a debateable subject at the Municipal Board. The majority of the Town Commissioners gave the contract to the Killarney Electric Light Company, who have just commenced operations for the lighting of the streets. The Gas Company, it is understood, will continue the gas lighting until the matter is settled in a Court of Law. We agree with our contemporary that if, in the end, the ratepayers have to pay for the double lighting of the town, the Commissioners will not have created a bed of roses for themselves.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 794.)

Issue.	Share	When ex-Dividend.	Dividend or Div. Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	12 Apl.	10½	Alliance & Dublin 10 p. c.	10	17½—18½	..	5 13 6
100,000	10	,,	7⅞	Do. 7 p. c.	10	12—13	..	5 15 4
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	106—108	..	4 12 6
100,000	20	14 Dec.	8	Bahia, Limited	20	10—11	..	14 10 10
200,000	5	15 Nov.	6½	Bombay, Limited	5	5—5½	..	5 18 2
40,000	5	,,	6½	Do. New	4	3¾—4¼	..	6 2 6
380,000	Stck.	28 Feb.	11½	Brentford Consolidated	100	217—222	..	5 3 7
180,000	,,	,,	8½	Do. New	100	165—170	..	5 0 0
820,000	Stck.	15 Mar.	11½	Brighton & Hove Original	100	210—215	+2½	5 6 11
888,500	Stck.	28 Feb.	5	Bristol	100	107—110	..	4 10 11
320,000	20	29 Mar.	11½	British	20	45—47	..	4 15 10
50,000	10	28 Feb.	11½	Bromley, Ordinary 10 p. c.	10	21—22	..	5 4 7
51,550	10	,,	8½	Do. 7 p. c.	10	15⅞—16½	..	5 3 0
328,750	10	28 July	2	Buenos Ayres (New) Limited	10	5⅛—6⅛	−⅛	3 1 6
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	101—104	..	5 15 5
150,000	20	23 Feb.	8	Cagliari, Limited	20	26—27	..	5 18 6
550,000	Stck.	12 Apl.	12½	Commercial, Old Stock	100	250—255	..	4 18 0
165,000	,,	,,	9½	Do. New do.	100	190—195	..	4 17 5
160,762	,,	14 Dec.	4½	Do. 4½ p. c. Deb. do.	100	132—137	..	3 5 8
800,000	Stck.	14 Dec.	13	Continental Union, Limited	100	232—237	..	5 9 8
200,000	,,	,,	10	Do. 7 p. c. Pref	100	204—209	..	4 15 8
535,000	Stck.	28 Feb.	5	Crystal Palace Ord. 5 p.c. Stk	100	105—110	..	4 10 11
486,090	10	31 Jan.	10	European, Limited	10	22—23	..	4 6 11
354,060	10	,,	10	Do. Partly paid	7½	15½—16½	..	4 10 11
5,616,590	Stck.	14 Feb.	12	Gaslight & Coke, A, Ordinary	100	228—233	..	5 3 0
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	98—102	..	3 18 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	273—278	..	3 12 0
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130—135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	190—195	..	3 16 11
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	175—180	..	3 17 9
463,000	,,	,,	10	Do. I, 10 p. c. Prf.	100	272—277	+2	3 12 3
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	165—170	+2	3 10 7
1,061,150	,,	14 Dec.	4	Do. 4 p. c. Deb. Stk.	100	127—130	..	3 1 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	132—137	..	3 5 8
908,000	,,	,,	6	Do. 6 p. c. do	100	177—182	..	3 5 11
3,800,000	Stck.	15 Nov.	12	Imperial Continental	100	217—222	−3	5 8 1
75,000	5	14 Dec.	6	Malta & Mediterranean, Ltd.	5	4⅛—5	..	6 0 0
560,000	100	2 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	109—111	+1	4 10 1
541,920	20	15 Nov.	5	Monte Video, Limited	20	13½—14½	..	6 18 0
150,000	5	30 Nov.	8	Oriental, Limited	5	5½—6¼	..	6 8 0
60,000	5	29 Mar.	7	Ottoman, Limited	5	3¾—4¼	..	7 7 4
166,870	10	31 Jan.	2	Pará Limited	10	2—2½	..	8 0 0
420,000	100	2 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	103—109	..	5 10 1
500,000	100	1 Dec.	6	2nd Do.	100	97—102	..	5 17 8
150,000	10	26 Apl.	6	San Paulo, Limited	10	9—10[a]	..	6 0 0
500,000	Stck.	28 Feb.	15½	South Metropolitan, A Stock	100	315—320	..	4 16 11
1,350,000	,,	,,	12	Do. B do.	100	253—258	..	4 13 0
260,000	,,	,,	13	Do. C do.	100	260—265	..	4 18 1
750,000	,,	17 Jan.	5	Do. 5 p. c. Deb. Stk.	100	153—157	..	3 3 8
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	210—215	..	5 7 0
				WATER COMPANIES.				
745,967	Stck.	29 Dec.	10	Chelsea, Ordinary	100	273—278	..	3 12 0
1,720,252	Stck.	12 Apl.	8	East London, Ordinary	100	216—221	..	3 12 5
544,440	,,	29 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	147—150	..	3 0 0
700,000	50	14 Dec.	8½	Grand Junction	50	113—117	..	3 12 6
708,000	Stck.	28 Feb.	11½	Kent	100	288—293	..	3 18 6
1,043,800	100	29 Dec.	9½	Lambeth, 10 p. c. max.	100	248—253	..	3 15 1
406,200	100	,,	7½	Do. 7½ p. c. max.	100	200—205	..	3 13 2
310,000	Stck.	29 Mar.	4	Do. 4 p. c. Deb. Stk.	100	132—135	..	2 19 3
500,000	100	14 Feb.	12½	New River, New Shares	100	365—370	..	3 5 6
1,000,000	Stck.	31 Jan.	4	Do. 4 p. c. Deb. Stk	100	133—136	..	2 18 10
902,300	Stck.	14 Dec.	6	S'thwk & V'xhall, 10 p. c. max.	100	157—162	..	3 14 1
126,500	100	,,	6	Do. D 7½ p. c. do.	100	147—152	..	3 19 0
1,155,066	Stck.	14 Dec.	10	West Middlesex	100	265—270	..	3 14 1

[a] Ex div.

New Joint Stock Companies.—The Tramway Motor Company, Limited, has been registered with a capital of £200,000, divided into 5000 preference and 15,000 ordinary £10 shares, for the purpose of acquiring the patents of the Connelly Motor Company relating to gas and oil engines and hydrocarbon motors.——The North Dean Chemical Company, Limited, has been formed, with a capital of £10,000, in £10 shares, to enter into an agreement with E. A. Brotherton to acquire and carry on the business of chemical manufacturers.

Boscastle Water Supply.—Mr. F. H. Tulloch, one of the Local Government Board's Inspectors, held an inquiry last Tuesday into an application by the Camelford Rural Sanitary Authority for sanction to borrow £600 for works of water supply for Boscastle. Mr. R. H. Worth, of Plymouth, had prepared plans for conveying the water of two springs by means of 2½-inch pipes from their source a mile up the valley to the village. The yield of the springs in November last was said to be 40,000 gallons and 25,000 gallons a day; and though no gaugings had been taken in summer, it was estimated that at least 25,000 gallons a day would be available, while the quantity required was only about 15,000 gallons. A storeage reservoir could be easily constructed if it were found necessary. The Inspector intimated that the mains would have to be increased to 3 inches in diameter; and he said that, before they sanctioned the loan, the Local Government Board would require the Sanitary Authority to conclude satisfactory agreements with the owners and tenants at present in enjoyment of the water.

Aldershot Water Supply.—The water-works of the Aldershot Gas and Water Company have for many years obtained their supply from coupled artesian tube wells; and the growing demands of the district are now being provided for by the erection of a new pumping-station, for which a 10-inch tube well, 320 feet deep, has recently been completed by Messrs. Le Grand and Sutcliff, of Bunhill Row, E.C. This forms the second of a new series of wells; and the two yield a supply of 300,000 gallons per day of ten hours, which will amply meet requirements for the present. The motive power for the pumps will be gas-engines.

The Bath Question in Lambeth.—At a conference of South London Vestries and District Boards, the following resolutions have been passed: (1) "This conference is of opinion that the question of the right of the Lambeth Water-Works Company to charge for water used in private dwelling-houses was not fairly raised in the case agreed upon by the Company and Mr. Samuel Walker, and laid before Mr. Justice Chitty on April 11, 1894; and that immediate steps should be taken to obtain a final declaration of the law on the matter." (2) "Pending obtaining a final decision, the consumers of water supplied by the Lambeth Water-Works Company be advised to continue to refuse to agree to pay the charge of 10s. made by the Company for each fixed bath." (3) "That each Vestry be asked to contribute to the costs incurred in obtaining such a declaration of the law in proportion to the rateable value of the parishes taking part in such action."

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON."

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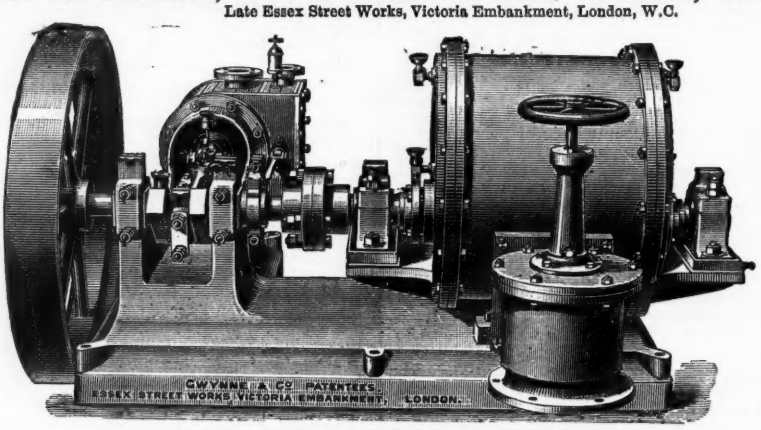
Late Essex Street Works, Victoria Embankment, London, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.



Engine and Exhauster Combined on One Bed-Plate.

GWYNNE & Co.'s Exhausters are constructed of large size to pass the required quantity of Gas at very slow speeds; the wear and tear being reduced to a Minimum.

Catalogues and Testimonials sent on Application.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

NO OTHER MAKER CAN DO THIS.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

ANDREW STEPHENSON, Agent. All communications *re* OXIDE to be addressed to PALMERSTON BUILDINGS, E.C.

BRIN'S Oxygen Company, Limited, Westminster. ANDREW STEPHENSON, Agent.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 200 British Gas-Works. [See Advt., p. 678.]
ANDREW STEPHENSON, 182, Gresham House, Old Broad Street, LONDON, E.C. Telegrams: "Volcanism, London."

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

JAMES LAWRIE & Co. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & CO., Huddersfield; AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 819 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

LIQUOR, Tar, and Spent Oxide wanted. BROTHERTON AND Co., Ammonia and Tar Distillers, BIRMINGHAM, LEEDS, and WAKEFIELD.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE & CO., direct Importers from Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

ALWAYS a Buyer of Spent Oxide, Tar, and AMMONIACAL LIQUOR.
Apply to J. HARDMAN, Milton, STAFFORDSHIRE.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.
GAS PLANT CEMENT
FOR ALL LEAKAGES.

TO INVENTORS AND OTHERS.

PATENTS for Inventions Secured and TRADE MARKS REGISTERED throughout the World. Advice on all matters connected with the above. Handbook gratis on application.
J. C. CHAPMAN, C.E., Chartered Patent Agent, 70, Chancery Lane, LONDON.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

WANTED, by a Gas Engineer, an Engagement Abroad. Has had eight years' experience in South America as Engineer and Manager.
Apply, by letter, to No. 2355, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

YOUNG Gentleman (aged 23) is desirous of obtaining a post as CLERK to a Gas Company. Six years' experience. Good knowledge of the Prepayment System. Excellent testimonials.
State salary and locality to No. 2376, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS AND CONTRACTORS.

WANTED, an engagement as Retort-SETTER. Twenty-five years' practical experience. Well up in Regenerative, Tar, Coal, and Breeze Fires.
Address No. 2378, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a medium-sized Gas-Works, near London, a CARBONIZING FOREMAN, to take charge of Engines, Exhausters, &c.
Apply, by letter, to No. 2377, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two or three Gentlemen well acquainted with Gas Companies to sell commodity in constant use. State experience, what connection, and what district most suitable.
Apply, by letter, to No. 2375, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two or Three Travellers with undoubted connections with Gas Companies. Say in what part of England connection exists, and Salary required.
Apply, by letter, stating experience and full particulars, to No. 2373, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an active Man as Stoker. Must have had some experience with Gas Engine and Exhauster, and must be a good Carbonizer. Copies of references only to be sent (which will not be returned). Wages 25s. per week.
Apply, stating age, &c., to the MANAGER, Gas-Works, Lynchford Road, Farnborough, HANTS.

FOR SALE—A new 25,000 ft. Telescopic GASHOLDER and TANK. Delivered and erected in any part of England.
BAKER, 2, Commercial Buildings, LEEDS.

TWO Gasholders for Sale (one having Wrought-Iron Tank); Single Lifts. Each 100 feet diameter by 24 feet deep.
Apply, by letter, to No. 2379, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WIRKSWORTH GASLIGHT AND COKE COMPANY, LIMITED.

TAR AND LIQUOR CONTRACT.

THE Directors of the above Company are open to receive TENDERS for TAR and LIQUOR, made at their Works during the Year dating from the 1st day of May, 1894, to April 30, 1895.
Probable Quantity: Tar, 50 tons; Liquor, 75 tons; the same will be delivered in Buyer's Tanks at the Wirksworth (Midland) Railway Station.
Sealed tenders, endorsed "Tender for Tar," or "Liquor," to be sent to R. Wall, Esq., the Chairman, on or before May 7, 1894.
The Directors do not bind themselves to accept the highest or any tender.

JAMES LEE,
Manager.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on forms to be obtained at the Office of the Gas-Works Manager, for the supply of screened GAS COAL and CANNEL for the Year ending the 30th of June, 1895.
Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office not later than Twelve o'clock Noon on Wednesday, the 2nd day of May, 1894.
The lowest or any tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
April 20, 1894.

LEEDS CORPORATION GAS DEPARTMENT.

THE Gas Committee of the above Corporation solicit TENDERS for WOOD GRIDS for Purifying purposes.
Quantity required, 2000 Grids.
Sample grid to be sent to the Engineer, Gas-Works, New Wortley, on or before Saturday, the 12th of May next.
Tenders of price per square foot, addressed to the Chairman of the Gas Committee, Municipal Offices, Leeds, will be received not later than Wednesday, the 16th of May next, and endorsed "Tender for Wood Grids."
April 30, 1894.

LEEDS CORPORATION GAS DEPARTMENT.

THE Gas Committee of the above Corporation solicit TENDERS for the supply of good PAINT, suitable for painting Gasholders.
Sample tin, containing not more than 5 lbs. mixed ready for use (Colour, dark red), to be sent to the Gas Stores Department, 21, Dewsbury Road, Leeds, not later than Saturday, the 5th of May next; and price per hundredweight to be quoted, delivered at the Stores aforesaid.
Tenders will be received, addressed to the Chairman of the Gas Committee, Municipal Offices, Leeds, not later than Wednesday, the 16th of May next, and endorsed "Tender for Gasholder Paint."
April 30, 1894.

LEEDS CORPORATION GAS DEPARTMENT.

TENDERS required as below:—
For CRAVEN or DERBYSHIRE LIME.
For WROUGHT-IRON TUBES.
Forms of Tender may be had on application to Mr. Lupton, at the Offices of the Gas Department, Municipal Buildings, Leeds.
Sample bundles of tubes to be sent as directed on form of tender.
Endorsed tenders, addressed to the Chairman at the Offices as above, will be received not later than Wednesday, the 16th of May next; and no tender will be considered except on the Form provided.
The lowest or any tender will not necessarily be accepted.
April 30, 1894.

DENTON AND HAUGHTON LOCAL BOARD.
(GAS DEPARTMENT.)

COAL.

THE Gas Committee invite Tenders for COAL, the same to be sent in on or before the 10th of May.
Specification and Form of Tender may be obtained from the Manager (Mr. J. Chadwick Smith), Gas-Works, Denton, near Manchester.
The Committee do not bind themselves to accept the lowest or any tender.

By order,
JOHN RICHARDS,
Clerk to the Board.

April 24, 1894.

DENTON AND HAUGHTON LOCAL BOARD.
(GAS DEPARTMENT.)

TAR.

THE Gas Committee invite Tenders for TAR, the same to be sent in on or before the 10th of May.
Particulars may be obtained from the Manager (Mr. J. Chadwick Smith), Gas-Works, Denton, near Manchester.
The Committee do not bind themselves to accept the highest or any tender.

By order,
JOHN RICHARDS,
Clerk to the Board.

April 24, 1894.

HAVERHILL LOCAL BOARD.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Haverhill Local Board are desirous of receiving TENDERS for the supply of 1000 tons of GAS COAL during the period of One Year from the 30th day of June next.
All persons submitting tenders must state the price per ton of 20 cwt., delivered free to Haverhill Station; and the person whose tender is accepted will be required to deliver the Coal in such quantities as the Board may from time to time require until the contract is completed.
The Board reserve the right to divide the Contract into two of 500 tons each.
Sealed tenders, marked "Tender for Coal," should be addressed and sent to me the undersigned not later than Tuesday, the 15th day of May next.

CHARLES F. FREEMAN,
Clerk.

Haverhill, April 23, 1894.

LIVERPOOL UNITED GASLIGHT COMPANY.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 72,000 tons of CANNEL and 50,000 tons of COAL, to be delivered at the various Works of the Company, during the period of Twelve Months between the 1st of July, 1894, and the 30th of June, 1895.
Tenders will be received for the whole or any portion of the above quantity.
The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.
Full Particulars and Printed Forms of Tender can be obtained on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom tenders, on the printed form, must be delivered, on or before Saturday, the 12th of May, endorsed "Tender for Cannel and Coal."

By Order,
WILLIAM KING,
Engineer.

Gas Office, Duke Street, Liverpool,
April 26, 1894.

TO TAR DISTILLERS, ETC.

THE Arbroath Gas Corporation invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Works for One Year from the 1st of June next.
Coals Carbonized, about 4500 tons annually.
The Tar and Liquor will be sold mixed at so much per 100 Gallons at the Gas-Works.
Specifications, containing Conditions, &c., of Contract may be obtained from the undersigned.
Sealed tenders, endorsed "Tender for Tar and Liquor," to be lodged with the Gas Manager, Arbroath, not later than Ten a.m. on the 7th day of May next.

ROBERT S. CARLOW,
Manager.

Gas-Works, Arbroath,
April 23, 1894.

THE Spalding Improvement Commissioners invite TENDERS for the supply and erection of Two CORRUGATED IRON ROOFS at the Gas-Works.
Plans may be seen and further Particulars obtained on application to J. G. Hawkins, Manager, Gas-Works, Spalding.
Tenders to be sent to the undersigned not later than the 8th of May next, endorsed "Tender for Roofs for Gas-Works."
The Commissioners do not bind themselves to accept the lowest or any tender.

By order,
H. H. HARVEY, Clerk to the
Spalding Improvement Commissioners.

April 23, 1894.

CORPORATION OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive, on or before Wednesday, the 23rd of May next, OFFERS of High-Class CANNELS and COALS suitable for gas-making, for delivery, at their Gaythorn, Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three Years, commencing the 1st of July, 1894.
Particulars and printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
April 13, 1894.

THE Directors of the Caterham and District Gas, Light, and Coke Company, Limited, are prepared to receive TENDERS for the supply of about 1400 to 1500 tons of DURHAM GAS COAL to April 30, 1895, to be delivered in quantities of about 150 to 200 tons, as ordered.
Tenders, stating name of coal and price, delivered f.o.b. at Upper Warlingham Station (L.B & S.C.R.), and at Atkins' Siding, Caterham Branch S.E.R. (both points of delivery to be quoted for), to be sent to the Chairman, on or before Wednesday, May 9, endorsed "Tender for Coals."
Terms: Net cash, monthly.

G. W. ANDERSON,
Engineer and Secretary.

Caterham & District Gas, Light, & Coke Coy., Ltd.,
Godstone Road, Whyteleafe S.O.,
Surrey, April 24, 1894.

WALLASEY GAS AND WATER WORKS.

TO COAL MERCHANTS AND OTHERS.

THE Wallasey Local Board are pre-pared to receive TENDERS for the supply of about 16,000 tons of CANNEL and GAS COAL for their Gas-Works, delivered in Waggons at Duke Street, Birkenhead, separately, for One, Two, or Three Years, from the 30th of June next.
Specifications and any further Information may be obtained on application to the Engineer at the said Works.
Sealed tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be left at my Office, as below, not later than Five o'clock in the Afternoon of Thursday, the 10th day of May, 1894.
The contractor will be required to enter into a bond with approved sureties for the due performance of the contract.
The Board do not bind themselves to accept the lowest or any tender.

By order,
W. DANGER,
Clerk to the Board.

Public Offices, Egremont, Cheshire,
April 27, 1894.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 45,000 tons of best, well-screened, large GAS COAL, to be delivered between July, 1894, and the 30th of June, 1895, in monthly quantities in accordance with the Specification.
Parties tendering may do so for the whole quantity or for quantities from 5000 tons upwards.
Forms of Tender and Specification of monthly deliveries may be obtained on application to Mr. H. Morley, the Company's Engineer.
Sealed tenders to be sent to the undersigned not later than Thursday, the 3rd day of May next, addressed to the Chairman of the Company, and endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order,
GEORGE CLARRY,
Secretary.

Gas Offices, Cardiff,
April 11, 1894.

HERTFORD GASLIGHT COMPANY.

TO TAR DISTILLERS, ETC.

TENDERS are invited for the surplus TAR and AMMONIACAL WATER—Stock and Twelve Months' make.

Further particulars may be had on application to

R. W. BRETT,
Secretary, &c.

TENDERS FOR COAL.

THE Directors of the Tenterden Gas Company invite TENDERS for the supply of 500 tons of best PELAW MAIN GAS COAL, to be delivered at Headcorn or Appledore Station (S.E.R.) as and when required.

Sealed tenders, endorsed "Coal," to be sent to the Secretary on or before May 12.

The Directors do not bind themselves to accept the lowest or any tender, or supply forms of tender.

W. T. MERCER,
Secretary.

Tenterden, April 28, 1894.

THE Directors of the Market Harborough Gas Company invite TENDERS for:—

2200 tons of Screened GAS COAL.
100 tons of LIME.
26 tons of SULPHURIC ACID.

Further information as to delivery may be obtained at the Works.

Sealed tenders, giving price per ton at Market Harborough Station, to be endorsed "Tender," and sent to the Chairman of the Company, Mr. William Gillert, on or before the 9th of May next.

No pledge is given to accept the lowest or any tender.

CHAS. BURGOINE,
Secretary.

April 17, 1894.

SLIGO GASLIGHT AND COKE COMPANY,

INCORPORATED BY ACTS OF PARLIAMENT, 1855 AND 1893.

SALE BY TENDER OF 4½ (FOUR-AND-A-HALF) PER CENT. PREFERENCE SHARES.

NOTICE is Hereby Given, that the Directors of the Sligo Gaslight and Coke Company will sell by TENDER to be received at the Company's Office, Wine Street, Sligo, not later than Twelve o'clock noon, on Wednesday, the 23rd day of May, 1894, £4000 4½ PER CENT. PREFERENCE SHARES of the Company, in Lots of single Shares of £10 each.

The Shares now for sale are the first portion of the sum of £6000 Additional Capital authorized to be raised by the Sligo Gas Order, 1893, and will be entitled to interest at the rate of 4½ per cent. per annum, on and from the 1st day of June, 1894.

These Shares take precedence of the Ordinary Shares of the Company, amounting to £9000, and are a very safe and desirable investment.

Conditions of Sale and Form of Tender may be obtained upon application to the Secretary of the Company at the Office, Wine Street, Sligo.

By order,
C. B. TULLY,
Secretary.

Sligo, April 14, 1894.

MEIKLEJOHN'S PATENT

Improved Slide-Valve Anti-Dip

Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.

Is cheap and easily fixed to any form of main.

Will be found the most efficient appliance of the kind yet introduced.

Further particulars and price from

C. MEIKLEJOHN,
GAS-WORKS, RUGBY.
(Late N. MEIKLEJOHN, Longwood.)

HOLMSIDE GAS COALS.

(Wrought out of Holmside and South Moor Collieries.)

PRESENT production 4000 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1½ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of nearly

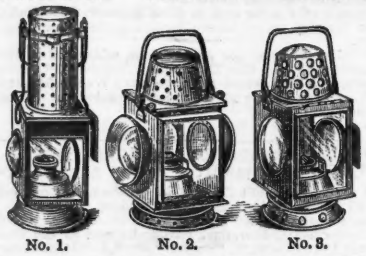
600,000 Tons per Annum.

Full particulars on application to

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

ARMSTRONG'S PATENT

CANDLE SAFETY LAMPS.



No. 1. No. 2. No. 3.

43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road,

CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Ipswich Gaslight Company, Devonport Gas Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

T. B. KITTEL, SHEFFIELD.

CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL

ENGLISH & SCOTCH CANNELS.

REAL SILKSTONE GAS COAL

ANALYSIS AND PRICES ON APPLICATION.

T. B. KITTEL, SHEFFIELD.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, LESSEE, MINER, AND SHIPPER OF NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

11, BAY STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

London Office:

90, CANNON STREET, E.C.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.

Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

Messrs. The

WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your THORNLEY GAS COAL exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.
Illuminating Power of Gas, average of a series of tests, 17 Sperm Candles.

The Coke was of excellent quality.

The following is a complete ultimate Analysis of the Coal.

	Per Cent.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
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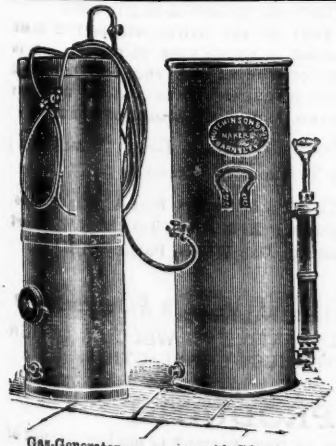

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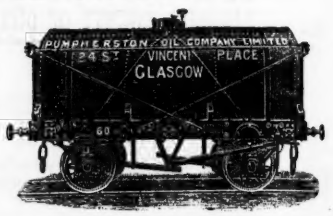

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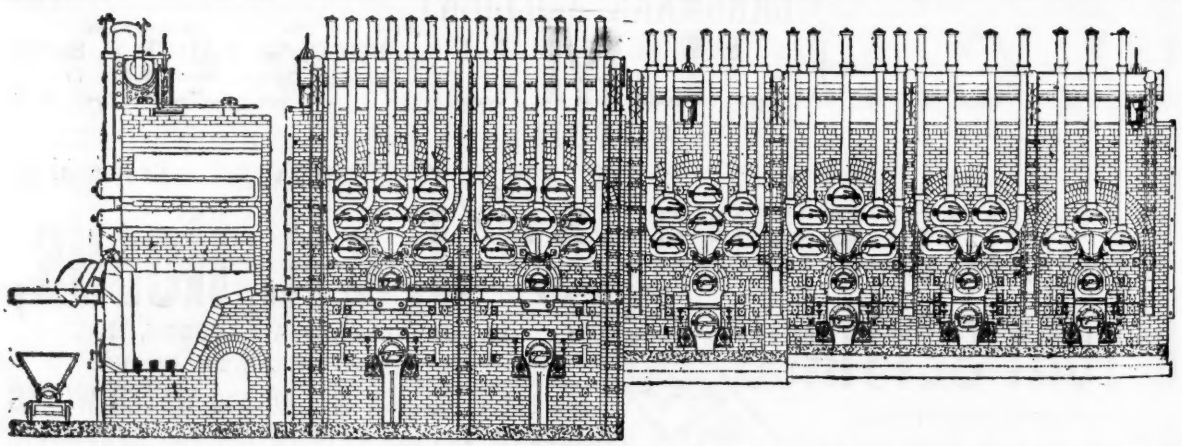

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Drawings and Specifications are furnished for the complete erection of Ovens, with or without Retort and Bench Mountings; or complete erection undertaken if required, and carried out by specially Trained Workmen.

Further particulars may be obtained on application to the Patentee's Agents: C. M. HAMILTON, 5, Stuart Street, Shawlands, Glasgow; J. E. FISHER, Stourbridge; JOHN WALSH & SONS, Retort Builders, Halifax, Yorkshire; RICHARD TURNER, Retort Builder, Denton, Lancashire; and from the Principal Agent, R. F. HISLOP (son of Patentee), Gas-Works, Paisley, N.B.

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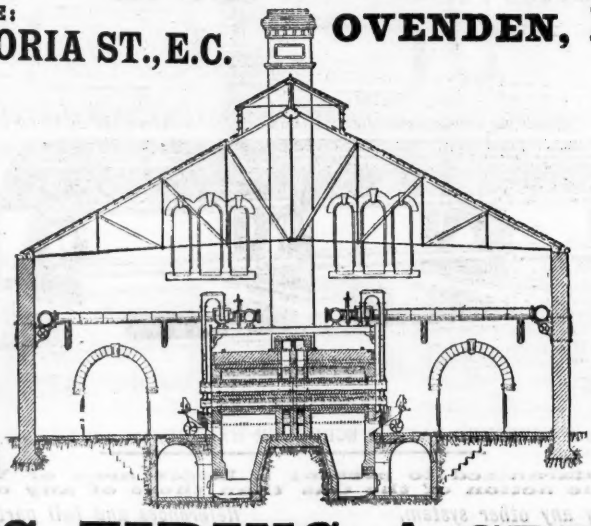

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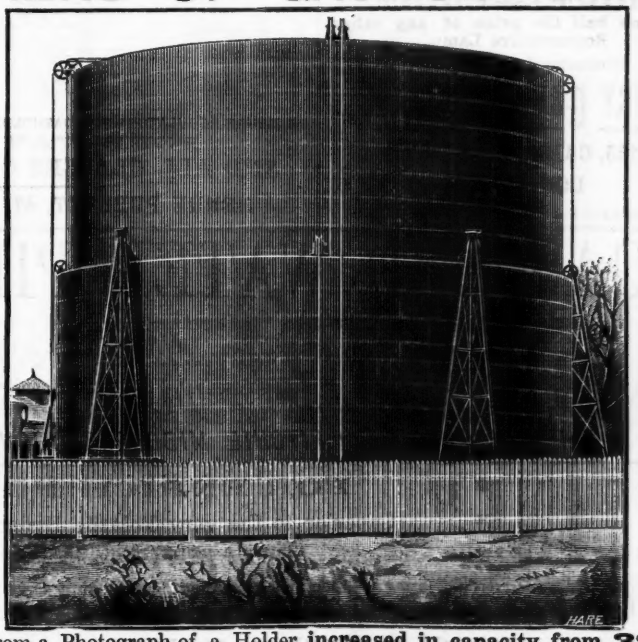

WIRE ROPE SYSTEM

This Engraving is taken from a Photograph of a Holder **increased in capacity from 32,000 cubic feet to 59,000 cubic feet** by the addition of a Lift. The Ropes are applied to both Lifts to supplement the Standards.

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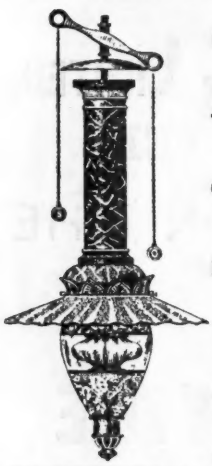
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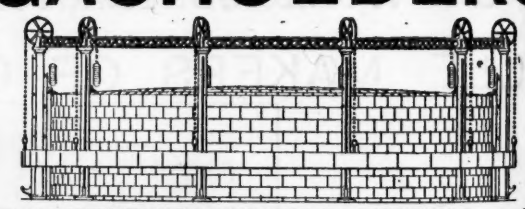
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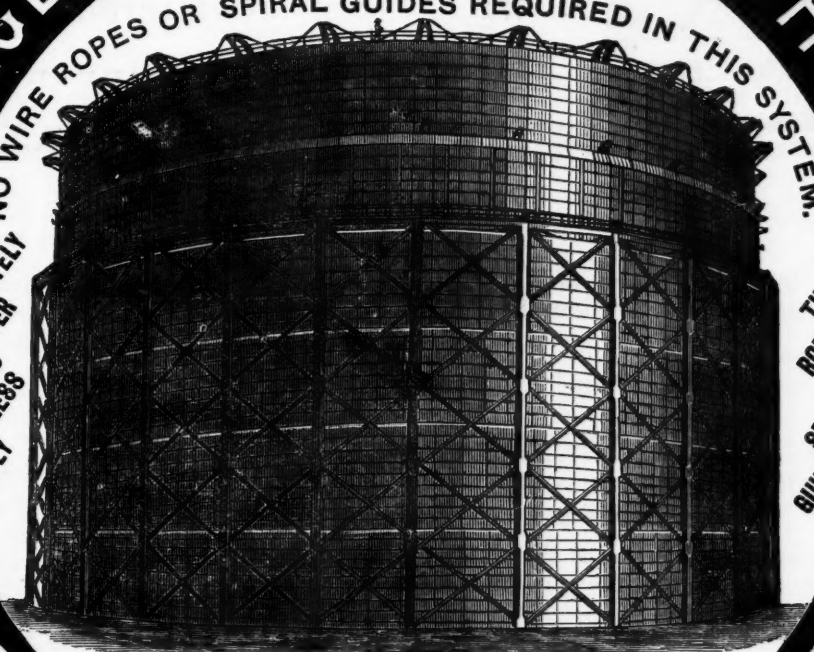

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[See also Advt. p. 790.

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